VIKRAMA SIMHAPURI UNIVERSITY:: NELLORE

Syllabus for Master of Computer Science for V.S. University Constituent College(s) and Affiliated Colleges under the jurisdiction of Vikrama Simhapuri University, Nellore with effect from 2020-'21 Academic Year

VISION

Ethical technocrat graduated students responsibly serving, impacting and transforming the Industry and Society.

MISSION

1. The department aims to generate groomed, technically component and skilled intellectual professionals to meet the current challenges of the modern computing industry.
2. The department strives to groom students with diverse backgrounds into competitive software professionals with moral values and committed to build a vibrant nation.
3. Providing a strong theoretical and practical background across the computer science discipline with an emphasis on software development.
4. To achieve employability by effectively developing their technical skills, communication skills and personality.
5. To encourage entrepreneurial environment and nurture innovative ideas.
6. To synchronize concepts, logic and skills for effective decision making.

PROGRAMME OUTCOMES (POs)

PO1	**Computational Knowledge:** Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.
PO2	**Problem Analysis**: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.
PO3	**Design / Development of Solutions**: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies
PO4	**Modern Tool Usage:** Ability to select modern computing tools, skills and techniques necessary for innovative software solutions
PO5	**Professional Ethics**: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.
PO6	**Life-long Learning**: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
PO7	**Communication Efficacy:** Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
PO8	**Societal & Environmental Concern:** Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.
PO9	**Individual & Team Work:** Ability to work as a member or leader in diverse teams in multidisciplinary environment.
PO10	**Innovation and Entrepreneurship:** Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1	Empowering the students for continuous learning and deliver efficient solutions for emerging challenges in the computation domain.
PSO2	Ability to apply standard software engineering principles to develop viable solutions for Information Technology Enabled Services (ITES).
PSO3	Able to excel in various programming/project competitions and technological challenges laid by professional societies.

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First Semester										
Course Code	**Title of the Course**	**Course Type**	**Course Credits**	**L**	**T**	**P**	**Total**	**Sess. Max. Marks**	**Univ. Max. Marks**	**Total Marks**
20R MSC101	Discrete Mathematical Structures	Core	4	3	1	0	4	30	70	100
20R MSC102	Computer Organization	Core	4	3	1	0	4	30	70	100
20R MSC103	Data Structures using C	Core	4	3	1	0	4	30	70	100
20R MSC104	Database Management Systems	Core	4	3	1	0	4	30	70	100
20R MSC105	Operating Systems	Core	4	3	1	0	4	30	70	100
20R MSC103P	Data Structures using C	Practical	2	0	0	4	4	30	70	100
20R MSC104P	Database Management Systems using SQL Server	Practical	2	0	0	4	4	30	70	100
20R MSC105P	Operating Systems using C Lab	Practical	2	0	0	4	4	30	70	100

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Second Semester										
Course Code	**Title of the Course**	**Course Type**	**Course Credits**	**L**	**T**	**P**	**Total**	**Sess. Max. Marks**	**Univ. Max. Marks**	**Total Marks**
20R MSC201	Design & Analysis of Algorithms	Core	4	3	1	0	4	30	70	100
20R MSC202	Computer Networks	Core	4	3	1	0	4	30	70	100
20R MSC203	Object Oriented Programming using Java	Core	4	3	1	0	4	30	70	100
20R MSC204	Software Engineering	Core	4	3	1	0	4	30	70	100
20R MSC205	Operations Research	Core	4	3	1	0	4	30	70	100
20R MSC201P	Object Oriented Programming using Java	Practical	2	0	0	4	4	30	70	100
20R MSC204P	Software Engineering using UML Lab	Practical	2	0	0	4	4	30	70	100
20R MSC202P	Computer Networks using Java	Practical	2	0	0	4	4	30	70	100
20R MSC208P	Mini Project	Practical	2							

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Third Semester										
Course Code	**Title of the Course**	**Course Type**	**Course Credits**	**L**	**T**	**P**	**Total**	**Sess. Max. Marks**	**Univ. Max. Marks**	**Total Marks**
20RMSC301	Artificial Intelligence	Core	4	3	1	0	4	30	70	100
20R MSC302	Web Technologies	Core	4	3	1	0	4	30	70	100
20R MSC303	Programming using PHP	Core	4	3	1	0	4	30	70	100
20R MSC304	1. Advanced Java Programming 2. C# Programming 3. Software Testing	Core	4	3	1	0	4	30	70	100
20R MSC305	1. Data Ming & Data Warehousing 2. Cryptography & Network Security 3. Computer Graphics	Core	4	3	1	0	4	30	70	100
20R MSC302P	Web Technologies Lab	Practical	2	0	0	4	4	30	70	100
20R MSC303P	Programming using PHP Lab	Practical	2	0	0	4	4	30	70	100
20R MSC304P	MSC20304 Elective Lab	Practical	2	0	0	4	4	30	70	100

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Fourth Semester										
Course Code	**Title of the Course**	**Course Type**	**Course Credits**	**L**	**T**	**P**	**Total**	**Sess. Max. Marks**	**Univ. Max. Marks**	**Total Marks**
20RMSC401	Major Project Work	Project	12	0	0	0	0	100	200	300

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20RMSC101	Course Name	Discrete Mathematical Structure		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To introduce concepts of mathematical logic for analyzing propositions and proving theorems. 2. To use sets for solving applied problems, and use the properties of set operations algebraically. 3. To investigate functions as relations and their properties. 4. To introduce basic concepts of graphs, digraphs and trees.				
UNIT -1	**Foundations:** Basics, Sets and Operations of Sets, Relations and Functions,Some Methods of Proof and Problem – Solving Strategies, Fundamentals of Logic, Logical Inferences, Methods of Proof of an Implication, First Order Logic and Other Methods of Proof, Rules of Inference for Quantified Propositions, Mathematical Induction. **Chapter (1)** **Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion - Exclusion. **Chapter (2)**				
UNIT -2	**Recurrence Relations:** Generating Functions of Sequences, Calculating Coefficients of Generating functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The Method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations. **Chapter (3)**				
UNIT -3	**Relations and Digraphs:** Relations and Directed Graphs, Special Properties of Binary Relations, Equivalence Relations, Ordering Relations, Lattices and Enumerations, Paths and Closures, Directed Graphs and Adjacency Matrices, Operations on Relations. **Chapter (4)**				
UNIT -4	**Graphs:** Basic Concepts, Isomorphisms and Subgraphs, Trees and Their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color problem **(Chapter 5)**				
Text Books	1. Discrete Mathematics For Computer Scientists & Mathematicians (Chapter 1-5) by Joe L. Mott, Abraham Kandel and Theodore P. Baker.				
References	1. Discrete Mathematics & Its Applications with Combinatorics and Graph Theory by Kenneth H Rossen (TMH). 2. Discrete Mathematical Structures with Applications to Computer Science by J. P Tremblay and R. Manohar,, MCGraw Hill Education (India) Private Limited.				

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Analyze logical propositions via truth tables.	K4
CO2	Prove mathematical theorems using mathematical induction.	K5

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CO3	Understand sets and perform operations and algebra on sets	K2
CO4	Construct a spanning tree by using search techniques	K3

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	-	-	-	-	-	-	-	-	3	-	-
CO2	-	3	2	-	-	-	-	-	-	-	2	2	-
CO3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	3	-	-	-	-	-	-	-	-	3	-

1-Low, 2-Medium, 3-High

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20R MSC102	Course Name	Computer Organization		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To teach the basics involved in data representation and digital logic circuits used in the computer system, includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design 2. To understand the design of the various functional units and components of computers. 3. To identify the elements of modern instructions sets and their impact on processor design. 4. To explain the function of each element of a memory hierarchy.				
UNIT -1	**Number System:** Introduction to Number System, Decimal Number System, Octal Number System, Hexadecimal Number System, Conversion of Numbers Among Different Number Systems, Binary Arithmetic, Octal Arithmetic, Hexadecimal Arithmetic, Coding Schemes, Information Representation. **Digital Signals and Logic Gates**: Signals, Binary Logic, Logic Gates, Boolean Algebra, Postulates of Boolean Algebra, Simplification of Boolean Function.				
UNIT -2	**Logic Circuit Design:** Combinational Circuits, Design Procedure of a Combinational Circuit, Arithmetic Circuits, Digital Circuit Design, Register, Counters, Analysis of Clocked Sequential Circuits. **Digital Devices:** Integrated Circuits, Digital Multiplexer, Demultiplexers, Encoders, Decoders, Decoder Expansion, Read Only Memory (ROM). **Computer Organization:** Introduction Codes, Addressing Modes, Registers, Bus and Memory Transfers, Instruction Sets, Instruction Execution and Microoperation, Basic Computer Organizations, 8086 Microprocessor, Interrupts, Assembly Language Programming, Computer Arithmetic, Division Algorithm, Multiplication.				
UNIT -3	**Memory Organization:** Memory Unit, Memory Hierarchy, Random Access Memory (RAM), Associative Memory (Content Addressable Memory), Read Only Memory (ROM), Building Large Memories using Chips, Cache Memory, Virtual Memory. **Input / Output Organization:** Introduction, Accessing I/O Devices, I/O Module, I/O Techniques, Processor Bus, Subroutines, program Interrupts, Program Status Word **Control Organization:** An Introduction, Hardwired Control Organization, Microprogrammed Control Organization, Micro Instructions, Micro Instruction Format, Sequencing and Execution of Micro Instructions, Micro Operations.				

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UNIT -4	**Parallel Processing:** Concept of Parallel Processing, Pipelining, Vector Processing, Array Processors. **Introduction to System Software:** An Introduction, Language Translators, Batch Monitors, Introduction to Software Processors, Elements of Assembly Language Programming, Assembly Language Statements, Overview of the Assembly Process, Design of Assembler, Data Structure, Pass Structure of Assemblers. **Loaders:** Loader -An Introduction, Linker – Introduction, Linking and Loading Schemes, Program Relocatability, Linking for Program Overlays, What is a Compiler?, Approaches to Compiler Development, Structure of a Compiler, Pass Structure/ **Macros:** An Introduction, Macro Definition and Usage, Conditional Assembly, Expansion Time Variables, nested macro Calls, Schematics for Macro Expansion, Design of a Macro Preprocessor.
Text Books	1. Computer Organization by Instructional Software Research and Development (ISRD) Group, Lucknow, McGraw Hill Education (India) Private Limited, New Delhi.
References	1. Computer System Architecture, Morris Mano, 3rd Edition. 2. Computer Organization – Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os	K2
CO2	Analyze the performance of commercially available computers	K4
CO3	Identify, understand and apply different number systems and codes	K3
CO4	Design a pipeline for consistent execution instructions	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	2	-	-	-	-	-	-	-	3	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	3	-	-	-	-	-	-	-	-	2	-	2
CO4	3	-	-	-	-	-	-	-	-	-	2	2	-

1-Low, 2-Medium, 3-High

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20R MSC103	Course Name	Data Structures using C		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To introduce the fundamental concept of data structures 2. To understand the importance of data structures in the context of writing efficient programs. 3. To develop skills to apply appropriate data structures in problem solving 4. To understand concepts about searching and sorting techniques and solving problems by using fundamental data structures.				
UNIT -1	**Introduction to Data Structures:** Introduction to the Theory of Data Structures, Data Representation, Abstract Data Types, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Types, Data Types, and Data Structures, Refinement Stages **Principles of Programming and Analysis of Algorithms:** Software Engineering, Program Design, Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big 'O' Notation, Algorithm Analysis, Structured Approach to Programming, Recursion, Tips and Techniques for Writing Programs in 'C' **Arrays:** Introduction to Linear and Non- Linear Data Structures, One- Dimensional Arrays, Array Operations, Two- Dimensional arrays, Multidimensional Arrays, Pointers and Arrays, an Overview of Pointers.				
UNIT -2	**Linked Lists:** Introduction to Lists and Linked Lists, Dynamic Memory Allocation, Basic Linked List Operations, Doubly Linked List, Circular Linked List, Atomic Linked List, Linked List in Arrays, Linked List versus Arrays **Stacks:** Introduction to Stacks, Stack as an Abstract Data Type, Representation of Stacks through Arrays, Representation of Stacks through Linked Lists, Applications of Stacks, Stacks and Recursion **Queues:** Introduction, Queue as an Abstract data Type, Representation of Queues, Circular Queues, Double Ended Queues- Deques, Priority Queues, Application of Queues.				
UNIT -3	**Binary Trees:** Introduction to Non- Linear Data Structures, Introduction Binary Trees, Types of Trees, Basic Definition of Binary Trees, Properties of Binary Trees, Representation of Binary Trees, Operations on a Binary Search Tree, Binary Tree Traversal, Reconstruction of Binary Tree, Counting Number of Binary Trees, Applications of Binary Tree. **Searching and Sorting:** Sorting – An Introduction, Efficiency of Sorting Algorithms, Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Binary Tree Sort, Radix Sort, Shell Sort, Heap Sort, Searching – An Introduction, Linear or Sequential Search, Binary Search, Indexed Sequential Search.				

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UNIT -4	**Graphs:** Introduction to Graphs, Terms Associated with Graphs, Sequential Representation of Graphs, Linked Representation of Graphs, Traversal of Graphs, Spanning Trees, Shortest Path, Application of Graphs. **Hashing:** Introduction to Hashing, Hash Functions, Collision in Hashing, Collision or Conflict Resolution Techniques, Open Addressing, Analysis of Open Addressing, Chaining, Analysis of Chaining, Comparison of Hashing Methods.
Text Books	1. Data Structures using 'C', ISRD group Second Edition, TMH.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Define data structure and list out their applications and understands array & linked list data structures	K1, K2
CO2	Identify suitable data structures for different scenarios	K3
CO3	Evaluates the strength and weakness of different data structures	K5
CO4	Design programs for linear and non-linear data structures' operations	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO4	3	3	3	3	-	3	3	-	-	2	3	3	3
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20R MSC104	Course Name	Database Management Systems		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the basic concepts and terminology related to DBMS and Relational Database Design 2. To understand the different issues involved in the design and implementation of a database system. 3. To understand and use data manipulation language to query, update, and manage a database. 4. To understand DBMS techniques to construct tables and write effective queries, functions, procedures and to understand Database Administration & Database Recovery.				
UNIT -1	**Database Fundamentals:** Definitions of Database, DBMS, Characteristics of the Database Approach, Advantages and Applications & DBMS, Database Administrator (DBA) & Data Administrator. **DBMS Architecture, Database Languages:** DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Queering, Database System Environment, Centralized and Client, Server Archituchers for DBMS, Entity Relationship Diagram, Applications & Examples of Database, Relationship Sets and Structural Constraints - Weak, Strong Entity Types.				
UNIT -2	**Relational Algebra and Calculus:** Relational Algebra - Selection and Projection, Set Operating, Renaming, Join, Division, Examples of Algebra Queries, Relational Calculus, Table Relational Calculus, Domain Relational Calculus, Expressive Power of Algebra and Calculus, Examples & Basic SQL Queries, Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, Null Values, Logical Connectives – AND, OR, NOT, Outers, Joins, Constraints in SQL Triggers.				
UNIT -3	**Schema Refinement:** Problems Caused By Redundancy, Decomposition, Problems Related to Decomposition, Functional Dependency, Database Tables and Normalization, Need For Normalization, Normal Forms - 1^{st} ,2^{nd} ,3^{rd}, BCNF, Properties of Decomposition - Loss Less Join Decomposition, Schema Refinement in Database Design, Multi Valued Dependencies, Fourth Normal Form, Fifth Normal Form.				
UNIT -4	**Overview & Transaction Management:** ACID Properties, Transaction and Schedules, Concurrent Execution of Transactions,- Local Based Concurrency Control, Deadlocks Concepts, Concurrency Control - Serializability and Recoverability, Introduction Lock Management - Lock Conversions, Dealing with Dead Locks, Locking Techniques, Concurrency Control Without Locking, Introduction to ARICS, The Log, Other Recover Related Structures.				

Text Books	1. Database System Concepts, A. Silberschatz, H.F. Korth, S.Sudarshan, Mcgraw Hill, VI Edition,-2006. 2. Fundamentals of Database Systems 5th Edition Ramez Elmasri, Shamkant, Navathe, Pearson Educations,2008. 3. Database System Concepts,Silberrchatz, Korth,Megrow Hill, V Edition.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Define and understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL	K1, K2
CO2	Develop ER-models to represent simple database application scenarios	K3
CO3	Accessing Databases from different Applications	K5
CO4	Improve the database design by normalization.	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	3	-	-	3	-	-	-	3	-	-
CO2	3	3	3	3	-	-	3	-	-	-	3	3	-
CO3	3	3	3	3	-	-	3	-	-	-	3	3	-
CO4	3	3	3	3	-	3	3	3	-	2	3	3	3
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20RMSC105	Course Name	Operating Systems		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the fundamental concepts and techniques of Operating Systems. 2. To study the concepts in process management and concurrency control mechanisms. 3. To understand the concepts in memory managements and deadlocks. 4. To study on file management and storage structures				
UNIT -1	**Introduction:** What is an Operating Systems Do, Computer System Organization, Computer System Architecture, Operating – System Structure, Operating – System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Distributed Systems, Special – Purpose Systems, Computing Environments **System Structures:** Operating – System Services, User Operating – System Interface, System Calls, Types of System Calls, System Programs, Operating – System Design and Implementation, Operating – System Structure, Virtual Machines, Operating – System Generation, System Boot **Process – Concept:** Overview, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems, Communication in Client – Server Systems				
UNIT -2	**Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple – Processor Scheduling, Thread Scheduling, Operating System Examples, Algorithm Evaluation **Synchronization:** Background, The Critical – Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples, Atomic Transactions **Deadlocks:** System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.				
UNIT -3	**Memory – Management Strategies:** Background, Swapping, Contiguous Memory Allocation, paging, Structure of the Page Table, Segmentation. **Virtual – Memory Management:** Background, Demand Paging, Copy – on – Write, Page Replacement, Allocation of Frames, Thrashing, memory – Mapped Files, Allocating Kernel Memory. **File System:** File Concept, Access Methods, Directory Structure, File – System Mounting, File Sharing, Protection.				
UNIT -4	**Implementing File Systems:** File – System Structure, File – System Implementation, Directory Implementation, Allocation Methods, Free – Space Management. **Secondary – Storage Structure:** Overview of Mass – Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap – Space management, RAID Structure, Stable – Storage Implementations, Tertiary – Storage Implementation.				

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Text Books	1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Seventh Edition.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand the concept of OS, resource management in operating systems ,implementation of file systems and directories along with the interfacing of IO devices with the operating system	K1
CO2	Evaluate various scheduling algorithms ,	K3
CO3	Identify the dead lock situation and provide appropriate solution so that protection and security of the operating system is also maintained.	K4
CO4	Ability to design and solve synchronization problems, Apply memory management techniques in the design of operating systems	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	1	-	3
CO2	3	-	-	-	-	-	-	-	-	-	-	2	3
CO3	-	3	2	-	-	-	-	-	-	-	-	1	-
CO4	-	3	-	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20R MSC103P	Course Name	Data Structures using C Lab		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. Write a program to read 'N' numbers of elements into an array and also perform the following operation on an array
2. Add an element at the beginning of an array
3. Insert an element at given index of array
4. Update a element using a values and index
5. Delete an existing element
6. Write a program using stacks to convert a given either one of the following
   a. postfix expression to prefix
   b. prefix expression to postfix
   c. infix expression to postfix
7. Write Programs to implement the Stack operations using an array
8. Write Programs to implement the Stack operations using Linked List.
9. Write Programs to implement the Queue operations using an array.
10. Write Programs to implement the Queue operations using Linked List.
11. Write a program for arithmetic expression evaluation.
12. Write a program for Binary Search Tree Traversals
13. Write a program to implement dequeue using a doubly linked list.
14. Write a program to search an item in a given list using the following Searching Algorithms
    a. Linear Search
    b. Binary Search.
15. Write a program for implementation of the following Sorting Algorithms
    a. Bubble Sort
    b. Quick Sort
16. Write a program for implementation of the following Sorting Algorithms
    a. Insertion Sort
    b. Merge Sort
17. Write a program for polynomial addition using single linked list
18. Write a program to implement Depth First Search graph traversals algorithm
19. Write a program to implement Breadth First Search graph traversals algorithm
20. Program for finding shortest path in graph.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	Knowledge Level
CO1	Understand various algorithms implantation process of different data structures	K2
CO2	Apply suitable data stature for a need	K3

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CO3	Analyse space and time complexity of various different data structures' operations	K4
CO4	Develops applications for implantations of different data structures' operations	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	2	-	-	-	3	3	3
CO2	3	3	3	-	-	-	2	-	-	-	3	3	3
CO3	3	2	3	-	-	-	2	-	-	-	3	3	3
CO4	3	2	3	-	-	-	2	-	-	-	3	3	3

1-Low, 2-Medium, 3-High

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Programme	**M.Sc. Computer Science**	**Semester**	**First**		
Course Code	**20R MSC104P**	**Course Name**	**Database Management Systems Lab**		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. Create **Student***(HTNO, Surname, FirstName, LastName, Percentage_of_Marks, Data_of_Joining, Department_ID)* and **Department**(Department_ID, Dept_Name, HOD, ContactNo, E-Mail) tables with relevant Primary Key, Foreign Key and other constraints. Perform the following
   a. Insert five student details in five departments
   b. Display all students order by department no
   c. Display all students in each department who has highest percentage
2. Create **Student***(HTNO, Surname, FirstName, LastName, Percentage_of_Marks, Data_of_Joining, Department_ID)* and **Department**(Department_ID, Dept_Name, HOD, ContactNo, E-Mail). Perform the following
   a. Insert five student details in five departments
   b. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block
   c. Alter any one of the field
   d. Delete students who are inserted without any department information
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5. Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Write PL/SQL procedure for an application using exception handling.
8. Write PL/SQL procedure for an application using cursors.
9. Write a PL/SQL block for transaction operations of a typical application using triggers.
10. Write a PL/SQL block for transaction operations of a typical application using package.
11. Generating Reports.
12. Demonstrate various join by create two tables and entries at least 5 records in each table.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	**Knowledge Level**
CO1	Understand the syntaxes for queries, procedures and functions	K2
CO2	Apply queries, procedures and functions for a need	K3

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CO3	Analyze effectives of different normal forms implementation	K4
CO4	Design a commercial relational database system	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	3	3
CO2	3	-	-	-	2	-	-	-	-	-	3	3	3
CO3	3	-	2	-	-	-	-	-	-	-	3	2	3
CO4	3	-	-	2	-	-	-	-	-	-	3	3	3
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	First		
Course Code	20R MSC105P	Course Name	Operating Systems Lab		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. Simulate the following CPU Scheduling algorithms
   a) Round Robin
   b) SJF
   c) FCFS
   d) Priority
2. Simulate all file allocation strategies.
   a) Sequential
   b) Indexed
   c) Linked
3. Simulate MVT and MFT
4. Simulate all File organization techniques.
   a) Single level directory
   b) Two level
   c) Hierarchical
   d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm Dead Lock Prevention.
7. Simulate all Page replacement algorithms.
   a) FIFO
   b) LRU
   c) LFU
   d) Etc….
8. Simulate Paging Techniques of memory management.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	Knowledge Level
CO1	Understand the syntaxes for queries, procedures and functions	K2
CO2	Apply queries, procedures and functions for a need	K3
CO3	Analyze effectives of different normal forms implementation	K4

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CO4	Design a commercial relational database system	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	3	3	3
CO2	3	-	-	-	2	-	-	-	-	-	3	3	3
CO3	3	-	2	-	-	-	-	-	-	-	3	2	3
CO4	3	-	-	2	-	-	-	-	-	-	3	3	3
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Second**		
Course Code	**20R MSC201**	**Course Name**	**Design & Analysis of Algorithms**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To introduce the concepts of algorithm and performance analysis. 2. To understand different algorithm design strategies for solving various problems. 3. To understand algorithmic design paradigms like Divide-and-Conquer, Dynamic Programming, Greedy, Branch and Bound etc. 4. To provide fundamental knowledge on Complexity Theory.				
UNIT -1	**INTRODUCTION:** Algorithm, Pseudo Code for expressing algorithms, Performance Analysis- Space Complexity, Time Complexity, Asymptotic Notations. Disjoint Sets- disjoint set operations, union and find algorithms.				
UNIT -2	**DIVIDE AND CONQUER:** General method, Applications-Binary Search, Merge Sort and Quick Sort. **GREEDY METHOD**: General Method, Applications- Job Sequencing with deadlines, 0/1 Knapsack Problem, Minimum cost spanning trees.				
UNIT -3	**DYNAMIC PROGRAMMING:** General Method, Applications-Optimal Binary Search Tree, 0/1 Knapsack Problem, All pair shortest path problem, Travelling Salesman Problem. **BACKTRACKING:** queen problem, Graph Coloring Problem and Hamiltonian Cycle.				
UNIT -4	**BRANCH AND BOUND**: Travelling Salesman Problem, 0/1 Knapsack Problem, FIFO Branch and Bound Search and LIFO Branch and Bound. **COMPLEXITY THEORY**: Introduction to NP Hard and NP Complete Problems.				
Text Books	1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press. 2. Design and analysis of algorithms, I.Chandra Mohan, 2nd Edition,PHI. 3. Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.				
References	1. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press. 2. Alfred V.Aho, John E Hopcroft and Jeffrey D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education, 1999.				

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Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Analyze the performance of a given algorithm by using Asymptotic Notations.	K4
CO2	Solve problems by using Divide-and-Conquer and Greedy Method.	K3
CO3	Remember dynamic programming and backtracking techniques for solving optimization problems.	K1
CO4	Design algorithms by using Branch and Bound Techniques. Also classify computational problems into P, NP, NP Hard and NP Complete	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	3	-	-	-	-	-	-	-	2	-	-
CO2	-	3	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	3	-	-	-	-	-	-	-	-	3	-
CO4	-	3	3	-	-	-	-	-	-	-	-	3	-

1-Low, 2-Medium, 3-High

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Programme	**M.Sc. Computer Science**	**Semester**	**Second**		
Course Code	**20R MSC202**	**Course Name**	**Computer Networks**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understands the fundamental concepts of computer networking and OSI Reference model. 2. To familiarize the student with the basic taxonomy and terminology of the computer networking area. 3. To learn and understand the advanced networking concepts, preparing the student for entry advanced courses in computer networking. 4. To develop and gain expertise in some specific areas of networking such as the design and maintenance of individual networks				
UNIT -1	**INTRODUCTION:** Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models. **PHYSICAL LAYER** –Introduction to physical layer-Data and Signals, Periodic analog signals, digital signals, transmission impairment, ,Data rate limits, performance -Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and Unguided media: Wireless-Radio waves, microwaves, infrared. **THE DATA LINK LAYER** - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes. Elementary.				
UNIT -2	**DATA LINK PROTOCOLS-** A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat. **THE MEDIUM ACCESS CONTROL SUBLAYER-**The Channel Allocation Problem-Static Channel AllocationAssumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Pure aloha- slotted aloha-Carrier Sense Multiple Access Protocols- Collision-Free Protocols-Limited Contention Protocols. **WIRELESS LAN PROTOCOLS-** Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sub-layer Protocol-Ethernet Performance-Fast Ethernet- Wireless LANs-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sub-layer Protocol- The 805.11 Frame Structure Services				

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UNIT -3	**THE NETWORK LAYER DESIGN ISSUES** – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical. **CONGESTION CONTROL ALGORITHMS**-General principles of congestion control, Congestion prevention policies, Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding. **INTERNET WORKING:** How networks differ- How networks can be connected-Tunneling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-, IP addresses-, Subnets-IP Version 6-The main IPV6 header- Internet control protocols- ICMP-ARPDHCP.
UNIT -4	**THE TRANSPORT LAYER:** Transport layer protocols: Introduction-services- port number-User datagram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control. **APPLICATION LAYER** — World Wide Web: HTTP , FTP-Two connections-control connection-Data connection-security of FTP-Electronic mail-Architecture- web based mail-email security- TELENET-local versus remote Logging. **DOMAIN NAME SYSTEM:** Name Space, DNS in Internet, - Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers.
Text Books	1. Computer Networks: Andrew S Tanenbaum David J. Wetherall, 5/e, Pearson 2. Data communications and networking: Behrouz Forouzan, 5/e, McGraw Hill
References	1. Computer Networks – A System Approach, Peterson, Bruce Davie,2/e , Harcourt Asia 2. Compute communications and networking technologies, Gallo, Hancock, Cengage 3. An Engineering approach to compute networking, Kesha, Pearson.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Knowledge on Network Architectures (TCP/IP and OSI) models, Protocol Suites	K1
CO2	Understand functionalities of layers in each Network Architecture	K2
CO3	Analyse different routing algorithms	K4
CO4	Apply suitable routing algorithms and protocols based on requirements	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	-	-	-	-	-	-	-
CO2	2	-	2	-	-	-	-	-	-	-	2	-	2
CO3	-	2	2	-	-	-	-	-	-	-	2	-	2
CO4	-	3	2	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Second		
Course Code	20R MSC203	Course Name	Object Oriented Programming using Java		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To impart knowledge of object-oriented paradigm in the Java programming language 2. To introduce the fundamentals of Object-Oriented Programming concepts in Java including Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism, and exception handling mechanisms etc. and apply them in problem solving. 3. To share knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. 4. To provide sufficient knowledge about developing real world projects with object oriented concepts				
UNIT -1	**INTRODUCTION TO JAVA:** Features of Java, The Java Virtual Machine, Parts of Java. **FIRST STEP TOWARDS JAVA PROGRAMMING:** API Document, Starting a Java Program, Formatting the Output. **NAMING CONVENTIONS AND DATA TYPES:** Naming Conventions in Java, Data Types in Java, Literals. **OPERATORS IN JAVA:** Operators, Priority of Operators. **CONTROL STATEMENTS IN JAVA:** if...else Statement, do...while Loop, while Loop, for Loop, switch Statement, break Statement, continue Statement, return Statement. **INPUT AND OUTPUT STREAMS IN JAVA:** Accepting Input from the Keyboard, Reading Input with java.util.Scanner Class, Displaying Output with System.out.printf(), Displaying Formatted Output with String.format() (Chapters: 2, 3, 4, 5, 6, 7 of the Text Book)				

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UNIT -2	**ARRAYS:** Types of Arrays, Three Dimensional Arrays (3D Array), Command Line Arguments. **STRINGS:** Creating Strings, String Class Methods, String Comparison, Immutability of Strings. **STRINGBUFFER AND STRINGBUILDER:** Creating StringBuffer Objects, StringBuffer Class Methods, StringBuilder Class, StringBuilder Class Methods. **INTRODUCTION TO OOPS:** Problems in Procedure Oriented Approach, Features of Object Oriented Programming System (OOPS). **CLASSES AND OBJECTS:** Object Creation, Initializing the Instance Variables, Access Specifiers, Constructors. (Chapters: 8, 9, 10, 11, 12 of the Text Book)
UNIT -3	**METHODS IN JAVA:** Method Header or method Prototype, Method Body, Understanding Methods, Static Methods, Static Block, The Keyword 'this', Instance Methods, Passing Primitive Data Types to Methods, Passing Objects to Methods, Passing Arrays to Methods, Recursion, Factory Methods. **RELATIONSHIP BETWEEN OBJECTS:** Relating Objects using References, Inner Class. **INHERITANCE:** Inheritance, The Keyword 'super', The Protected Specifier, Types of Inheritance. **POLYMORPHISM:** Polymorphism with Variables, Polymorphism using Methods, Polymorphism with Static Methods, Polymorphism with Private Methods, Polymorphism with Final Methods, final Class. **TYPE CASTING:** Types of Data Types, Casting Primitive Data Types, Casting Referenced Data Types, The Object Class. **ABSTRACT CLASSES:** Abstract Method and Abstract Class. (Chapters: 13, 14, 15, 16, 17, 18 of the Text Book)

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UNIT -4	**INTERFACES:** Interface, Multiple Inheritance using Interfaces. **PACKAGES:** Package, Different Types of Packages, The JAR Files, Interfaces in a Package, Creating Sub Package in a Package, Access Specifiers in Java, Creating API Document. **EXCEPTION HANDLING:** Errors in a Java Program, Exceptions, throws Clause, throw Clause, Types of Exceptions, Re-throwing an Exception. **THREADS:** Single Tasking, Multi Tasking, Uses of Threads, Creating a Thread and Running it, Terminating the Thread, Single Tasking Using a Thread, Multi Tasking Using a Thread, Multiple Threads Acting on Single Object, Thread Class Methods, Deadlock of Threads, Thread Communication, Thread Priorities, Thread Group, Daemon Threads, Applications of Threads, Thread Life Cycle. **APPLETS:** Creating an Applet, Uses of Applets, <APPLET> tag, A Simple Applet Program. (Chapters: 19, 20, 21, 26, 30 of the Text Book)
Text Books	1. Core JAVA An Integrated Approach by Dr. R. Nageswara Rao, Dreamtech Publication, 2010 Edition.
References	1. Java Fundamentals: A Comprehensive Introduction by Herbert Schildt, Dale Skrien, MC Graw Hill Education (India) private Limited, New Delhi Sixth reprint 2015.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand various programming paradigms	K2
CO2	Implement the concepts of object-oriented programming	K3
CO3	Gain knowledge about basics of Java Language to write Java Programming.	K1
CO4	Ability to design and develop Object Oriented programs	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	3	-	-	-	-	-	-	-	2	2	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Second		
Course Code	20R MSC204	Course Name	Software Engineering		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To familiarize the software lifecycle models and software development process 2. To understand the various techniques for requirements, planning and managing a technology project. 3. To Examine basic methodologies for software design, development, testing, closure and implementation. 4. To understand manage users expectations and the software development team.				
UNIT -1	**INTRODUCTION TO SOFTWARE ENGINEERING:** The evolving role of software, changing nature of software, software myths. **A GENERIC VIEW OF PROCESS:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. **PROCESS MODELS:** The waterfall model, incremental process models, evolutionary process models, the unified process.				
UNIT -2	**SOFTWARE REQUIREMENTS:** Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **REQUIREMENTS ENGINEERING PROCESS:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. **SYSTEM MODELS:** Context models, behavioural models, data models, object models, structured methods.				
UNIT -3	**DESIGN ENGINEERING:** Design process and design quality, design concepts, the design model. **CREATING AN ARCHITECTURAL DESIGN:** Software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modelling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams. **TESTING STRATEGIES**: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.				

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UNIT -4	**PRODUCT METRICS:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance. **METRICS FOR PROCESS AND PRODUCTS:** Software measurement, metrics for software quality. **RISK MANAGEMENT:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **QUALITY MANAGEMENT:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.
Text Books	1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition. 2. Software Engineering- Sommerville, 7th edition, Pearson Education. 3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.
References	1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley. 2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies. 3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	To understand the concepts of software engineering, requirement models, design models, SCM, different kinds of risks, project estimations and software testing techniques	K1
CO2	Analyze software requirements and process models required to develop a software system	K6
CO3	Examine different Testing Strategies for conventional software and metrics to evaluate the product.	K4
CO4	Demonstrate skills in applying risk and quality management principles for effective management of software projects	K2

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	2	-	-	-	-	-	2	-	-
CO2	2	2	3	-	-	-	--	-	-	-	2	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	2	-
CO4	3	-	2	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Second**		
Course Code	**20R MSC205**	**Course Name**	Operations Research		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand basics of phases, formulation of L.P.P. 2. To study Linear Programming, dynamic programming and optimization Techniques. 3. To understand the different models. 4. To understand the theory of games.				
UNIT -1	Basic Definitions, Scope, Objectives, Phases, Models and limitations of Operations Research – L.P.P – Formulations of L.P.P - Graphical Solutions of L.P.P. – Simplex Method – Artificial Variables – big M Method.				
UNIT -2	**TRANSPORTATION OF PROBLEM:** Formulation, Solution, Unbalance Transportation Problem, Finding Basic Feasible Solutions – North West Corner Rule – Least Cost Method – Vogel's Approximation Method. **ASSIGNMENT MODEL:** Formulation, Hungarian Method for Optimal Solutions, Solving Unbalanced Problem, Travelling Salesman as Assignment Problem.				
UNIT -3	**SEQUENCING MODELS:** Solution of Sequencing Problem - Processing 'n' Jobs through 2 Machines - Processing 'n' Jobs through 3 Machines – Processing 2 Jobs through 'm' Machines – Processing 'n' Jobs through 'm' Machines. **REPLACEMENT MODELS:** Introduction, Replacement of items that deteriorate with time. Case 1: value of money does not changes with time. Case 2: value of money changes with time.				
UNIT -4	**GAME THEORY:** Competitive Games, Rectangular Games – Saddle Point Minimax (Maximin) Method of Optimal Strategies, Value of Game, Solution of Games with Saddle Points, Dominance Principle, Rectangular Games without Saddle Point – Mixed Strategy for 2*2 Games, Graphical Method, Dominance Principle.				
Text Books	1. Kanthi swarup: P.K Gupta and Man Mohan ' Operations Research', 4th edition 2001.				
References	1. Operations Research by S.Kalavathy, Vikas Publications Towers pvt.Ltd. 2. Operations Research by Panneerselvam by Prentice Hall of India.				
Course Outcomes : After completion of the course student able to					

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	Course Outcome Description	Knowledge Level
CO1	Analyze any real life system with limited constraints and depict in a model form.	K4
CO2	Construct mathematical model for the problem	K3
CO3	Design the mathematical model manually as well using soft resources / software such as solver, TORA etc.	K6
CO4	Understand Variety of problems such as assignment, transportation, travelling salesman etc	K2

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	-	-	--	-	-	-	-	2	3	-
CO3	2	3	3	-	-	-	--	-	-	-	3	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	3	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Second		
Course Code	20R MSC204P	Course Name	Software Engineering using UML Lab		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		
Course Objectives					

List of Programmes

1. Develop Library system.
2. Develop Course Registration.
3. Design/Develop a Software application based on the principles of Software Engineering
4. Develop Online Book Shopping.
5. Develop Quiz System.
6. Develop Railway Reservation System
7. Given an application software perform Unit Testing
8. Given an application software perform Regression Testing
9. Develop Class Diagram, Usecase Diagram, Activity Diagram, Sequence Diagram, Collaboration Diagram, Component Diagram, Deployment Diagram, State Transition Diagram for ATM System
10. Develop Class Diagram, Usecase Diagram, Activity Diagram, Sequence Diagram, Collaboration Diagram, Component Diagram, Deployment Diagram, State Transition Diagram for Library Management System.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	Knowledge Level
CO1	Understands UML Diagrams	K2
CO2	Construct Different Application software Systems	K3
CO3	Analyze Software Testing Methods	K4
CO4	Develop a Software application based on the principles of Software Engineering	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	-	-	-	-	-	2	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-	3
CO3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	3	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Second**		
Course Code	**20R MSC201P**	**Course Name**	**Computer Networks Lab**		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. Implement the data link layer farming methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Write a program for selective report ARQ.
4. Write a program using Go Back NARQ method.
5. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
6. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.
7. Take an example subnet of hosts. Obtain broadcast tree for it.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	**Knowledge Level**
CO1	Understands functionality of different error detection and correction techniques	K2
CO2	Apply suitable algorithm or protocols while designing the programme	K3
CO3	Analyze the efficiency of various different error detection and correction technique/ routing algorithms	K4
CO4	Design programs using computer language	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	-	-	-	-	-	2	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-	3
CO3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	3	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Third		
Course Code	20RMSC301	Course Name	Artificial Intelligence		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the concepts of state space representation, heuristic search together with the time and space complexities. 2. To learn different knowledge representation techniques. 3. To understand the applications of AI, namely game playing and Machine Learning etc.. 4. To explore the current scope, potential, limitations, and implications of intelligent systems.				
UNIT -1	**WHAT IS ARTIFICIAL INTELLIGENCE:** The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success. **PROBLEMS, PROBLEM SPACES AND SEARCH:** Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs. **HEURISTIC SEARCH TECHNIQUES:** Generate – and – Test, Hill Climbing, Best – first Search, Problem Reduction, Constraint Satisfaction, Means – ends Analysis. **(Text Book 1: Chapter 1, 2, 3)**				
UNIT -2	**KNOWLEDGE REPRESENTATION ISSUES:** Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, The Frame Problem. **USING PREDICATE LOGIC:** Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction. **REPRESENTING KNOWLEDGE USING RULES:** Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge. **(Text Book 1: Chapter 4, 5, 6)**				

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UNIT -3	**NATURAL LANGUAGE PROCESSING:** Introduction, Overview of Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic Analysis and Representation Structures, Natural Language Generation, Natural Language Systems. **PATTERN RECOGNITION:** Introduction, The Recognition and Classification Process, Learning Classification Patterns, Recognizing and Understanding Speech. **VISUAL IMAGE UNDERSTANDING:** Introduction, Image Transformation and Low-Level Processing, Intermediate – Level Image Processing, Describing and Labeling Objects, High – Level Processing, Vision System Architectures. **(Text Book 2: Chapter 12, 13, 14)**
UNIT -4	**EXPERT SYSTEM ARCHITECTURES:** Introduction, Rule – Based System Architectures, Nonproduction System Architectures, Dealing with Uncertainty, Knowledge Acquisition and Validation, Knowledge System Building Tools. **GENERAL CONCEPTS IN KNOWLEDGE ACQUISITION:** Introduction, Types of Learning, Knowledge Acquisition Is Difficult, General Learning Model, Performance Measures. **EARLY WORK IN MACHINE LEARNING:** Introduction, Perceptrons, Checker Playing Example, Learning Automata, Genetic Algorithms, Intelligent Editors. **(Text Book 2: Chapter 15, 16, 17)**
Text Books	1. Elaine Rich, Kevin Knight and Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill, Third Edition. 2. Dan W.Patterson: "Introduction to Artificial Intelligence and Expert Systems", PHI
References	1. Stuart Russell and Peter Norvig: Artificial Intelligence A Modern Approach, Prentice – Hall of India Private Limited, Second Edition.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	The Ability to formulate an efficient problem space for a problem expressed in natural language.	K6
CO2	Select a search algorithm for a problem and estimate its time and space complexities.	K2,K5
CO3	Possess the skill for representing knowledge using the appropriate technique for a given problem.	K2
CO4	Possess the ability to apply AI techniques to solve problems of Natural Language Processing, Expert System, Pattern Recognition etc.,	K3

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K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	-	-	-	-	-	-	3	-
CO2	2	3	2	-	-	-	-	-	-	-	2	3	-
CO3	3	2	3	-	-	-	-	-	-	-	2	2	-
CO4	3	3	1	-	-	-	-	-	-	-	-	3	2
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC302**	**Course Name**	**Web Technologies**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To introduce XML and processing of XML Data with Java. 2. To build basic websites using HTML and Cascading Style Sheets. 3. To introduce Server side programming with Java Servlets and JSP. 4. To introduce Client side scripting with JavaScript.				
UNIT -1	**Introduction to HTML:** Introduction, Editing XHTML, First XHTML Example, W3C XHTML Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, Meta Elements. **Cascading Style Sheets (CSS):** Introduction, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style Sheets, Positioning Elements, Backgrounds, Element Dimensions, Box Model and Text Flow, Media Types, Building a CSS Drop – Down Menu, User Style Sheets, CSS 3.				
UNIT -2	**Javascript:** Introduction to Scripting: Introduction, Simple Program, Modifying Our First Program, Obtaining User Input with prompt Dialogs, Memory Concepts, Arithmetic, Decision Making. **Javascript: Control Statements 1:** Introduction, Algorithms, Pseudo Code, Control Structures, if Selection Statement, if...else Selection Statement, while Repetition Statement, Formulating Algorithms: Counter – Controlled Repetition, Sentinel – Controlled Repetition, Nested Control Statements. **Javascript: Control Statements 2:** Introduction, Essentials of Counter – Controlled Repetition, for Repetition Statement, Examples Using the for Statement, switch Multiple – Selection Statement, do... while Repetition Statement, break and continue Statements, Labeled break and continue Statements.				

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UNIT -3	**Javascript: Functions:** Introduction, Program Modules in JavaScript, Programmer – Defined Functions, Function Definitions, Random Number Generation, Example: Game of Chance, Another Example: Random Image Generator, Scope Rules, JavaScript Global Functions, Recursion, Recursion vs. Iteration. **Javascript: Arrays:** Introduction, Arrays, Declaring and Allocating Arrays, Examples Using Arrays, Random Inage Generator Using Arrays, References and Reference Parameters, Passing Arrays to Functions, Sorting Arrays, Searching Arrays: Linear Search and Binary Search, Multidimensional Arrays, Building an Online Quiz. **Javascript: Objects:** Introduction, Introduction to Object Technology, Math Object, Date Object, Boolean and Number Objects, document Object, window Object, Using Cookies, Final JavaScript Example, Using JSON to Represent Objects.
UNIT -4	**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP. Client-side Scripting: Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions. event handlers (onClick, onSubmit etc.), Document Object Model, Form validation.
Text Books	1. P.I. DEITEL, H.M. DEITEL, "Internet and World Wide Web, How to Program, Pearson Prentice Hall, Fourth Edition." 2. Web Technologies, Uttam K Roy, Oxford University Press. 3. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill.
References	1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech. 2. Java Server Pages —Hans Bergsten, SPD O'Reilly. 3. Java Script, D.Flanagan. 4. Beginning Web Programming-Jon Duckett WROX.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Analyze a web page and identify its elements and attributes.	K4
CO2	Outline XML fundamentals and usage of XML technology in electronic data interchange.	K2
CO3	Build dynamic web pages using JavaScript (client side programming).	K3
CO4	To design and develop web based enterprise systems for the enterprises using technologies like JSP, Servlet.	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	3	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	-	-	3	-	-	-	-	-	-	-	-	2	2
CO4	-	-	3	-	-	-	-	-	-	-	2	-	-
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC303**	**Course Name**	**Programming using PHP**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To create the awareness and importance of Open Source Systems. 2. To familiarize the student with basics of open source Systems. 3. To bring insight into different Open Source technologies. 4. To basic concepts of PHP language and developing web applications.				
UNIT -1	**Essential PHP:** Enter PHP, Getting PHP, Creating Your Development Environment, Creating a First PHP Page, Running Your First PHP Page, Mixing HTML and PHP, Printing Some Text, Printing Some HTML, More Echo Power, Using PHP "Here" Documents, Command - Line PHP, Adding Comments to PHP Code, Working with Variables, Sorting Data in Variables, Interpolation String, Creating Variable Variables, Creating Constants, Understanding PHP's Internal Data Types. **Operators and Flow Control:** PHP's Math Operators, Working with the Assignment Operators, Incrementing and Decrementing Values, The PHP String Operators, The Bitwise Operators, The Execution Operator, PHP Operator Precedence, Using the if Statement, The PHP Comparison Operators, The PHP Logical Operators, The else Statement, The elseif Statement, The ternary Operator, The switch Statement, Using for Loops, Using while Loops, Using do...while Loops. Using the foreach Loop, Terminating Loops Early, Skipping Iterations, PHP Alternate Syntax.				

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UNIT -2	**Strings and Arrays:** The String Functions, Converting to and from Strings, Formatting Text Strings, Building Yourself Some Arrays, Modifying the Data in Arrays, Deleting Array Elements, Handling Arrays With Loops, The PHP Array Functions, Converting Between Strings and Arrays Using Implode and Explode, Extracting Data from Arrays, Sorting Arrays, Using PHP's Array Operators, Comparing Arrays to Each Other, Handling Multidimensional Arrays, Using Multidimensional Arrays in Loops, Moving Through Arrays, Splitting and Merging Arrays, Other Array Functions. **Creating Functions:** Creating Functions in PHP, Passing Functions Some Data, Passing Arrays to Functions, Passing by Reference, Using Default Arguments, Passing Variable Numbers of Arguments, Returning Data from Functions, Returning Arrays, Returning Lists, Returning References, Introducing Variable Scope in PHP, Accessing Global Data, Working with Static Variables, PHP Conditional Functions, PHP Variable Functions, Nesting Functions, Creating Include Files, Returning Errors from Functions. **Reading Data in Web Pages:** Setting Up Web Pages to Communicate with PHP, Handling Text Fields, Handling Text Areas, Handling Check Boxes, Handling Radio Buttons, Handling List Boxes, Handling Password Controls, Handling Hidden Controls, Handling Image Maps, Handling File Uploads, Handling Buttons.
UNIT -3	**PHP Browser – Handling Power:** Using PHP's Server Variables, Using HTTP Headers, Getting the User's Browser Type, Redirecting Browsers with HTTP Headers, Dumping a Form's Data All at Once, Handling from Data with Custom Arrays, Putting It All in One Page, Performing Data Validation, Checking if the User Entered Required Data, Requiring Numbers, Requiring Text, Persisting User Data, Client – Side Data Validation, Handling HTML Tags in User Input. **Object – Oriented Programming:** Creating Classes, Creating Objects, Setting Access to Properties and Methods, Using Constructors to Initialize Objects, Using Destructors to Clean Up After Objects, Basic One Class on Another with Inheritance, Overriding Methods, Overloading Methods, Autoloading Classes. **Advanced Object – Oriented Programming:** Creating Static Methods, Static Members and Inheritance, Creating Abstract Classes, Creating Interfaces, Supporting Object Iteration, Comparing Objects, Creating Class Constants, Using the Final Keyword, Cloning Objects.

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UNIT -4	**File Handling:** Opening Files Using fopen, Looping over a File's Contents with feof, Reading Text from a File Using fgets, Closing a File, Reading from a File Character from a Character with fgetc, Reading a Whole File at Once with file_get_contents, Reading a File into an Array with File, Checking if a File Exists with file_exists, Getting File Size with file_size, Reading Binary Reads with fread, Parsing Files with fscanf, Parsing ini Files with parse_ini_file, Getting File info with Stat, Setting the File Pointer's Location with fseek, Copying Files with Copy, Deleting Files with unlink, Writing to a File with fwrite, Reading and Writing Binary Files, Appending to Files with fwrite, Writing a File All at Once with file_put_contents. **Working With Databases:** What is Database, Some Essential SQL, Creating a MySQL Database, Creating a New Tables, Putting Data into the New Database, Accessing the Database in PHP, Updating Databases, Inserting New Data Items into a Database, Deleting Records, Creating New Tables, Creating a New Database, Sorting Your Data. **Sessions, Cookies and FTP:** Setting a Cookie, Reading a Cookie, Setting Cookies' Expiration, Deleting Cookies, Working with FTP, Downloading Files with FTP, Uploading Files with FTP, Deleting a File with FTP, Creating and Removing Directories with FTP, Sending E – Mail, Sending Advanced E – Mail, Adding Attachments to E – Mail, Storing Data in Sessions, Writing a Hit Counter Using Sessions.
Text Books	1. PHP: The Complete Reference, Steven Holzner, Tata McGraw – Hill, Edition 2008.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Analyze a web page and identify its elements and attributes.	K4
CO2	Outline XML fundamentals and usage of XML technology in electronic data interchange.	K2
CO3	Build dynamic web pages using JavaScript (client side programming).	K3
CO4	To design and develop web based enterprise systems for the enterprises using technologies like JSP, Servlet.	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	3	-	-	-	-	-	-	-	-	-	-	3
CO2	3	2	2	-	-	-	-	-	-	-	3	2	-
CO3	-	-	3	-	-	-	-	-	-	-	3	2	-
CO4	3	-	-	-	-	-	-	-	-	-	3	-	-
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Third		
Course Code	20RMSC304 (Elective)	Course Name	1. Advanced Java Programming		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the multi-tier architecture implementation. 2. To know the Client-Server communication process. 3. To enable students to understand the concepts underlying technologies in JAVA Enterprise edition with Swings and multithreading, configuring Apache tomcat server, Java beans and Enterprise Java Beans. 4. To learn Remote Method Invocation and Database programming				
UNIT -1	**J2EE MULTI –TIER ARCHITECTURE:** Introduction to J2EE and J2SE, Distributive Systems, The Tier, J2EE Muti – Tier Architecture, Client Tier Implementation, Web Tier Implementation, Enterprise JavaBeans Tier Implementation, Enterprise Information Systems Tier Implementation, Challenges. **J2EE BEST PRACTICES:** Enterprise Application Strategy, The Enterprise Application, Clients, Sessions Management, Web Tier and Java Server Pages, Enterprise JavaBeans Tier, The Myth of Using Inheritance, Maintainable Classes, Performance Enhancements, The Power of Interfaces, The Power of Threads, The Power of Notification.				
UNIT -2	**J2EE DATABASE CONCEPTS:** Data, Database, Database Schema, The art of Indexing. **JDBC OBJECTS:** The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC Process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Metadata. **JDBC AND EMBEDDED SQL -** Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data from a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, View.				
UNIT -3	**JAVA AND XML:** Generating an XML Document, Parsing XML, Quick Reference Guide. **JAVA SERVLETS:** Java servlets and Common Gateway Interface Programming, A Simple Java Servlet, Anatomy of a Java servlet, Reading Data from a Client, Reading HTTP Request Headers, Sending Data to a Client and Writing the HTTP Response Header, Working with Cookies, Tracking Sessions. **JAVA SERVER PAGES:** JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects.				

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UNIT -4	**ENTERPRISE JAVABEANS:** Enterprise JavaBeans, Deployment Descriptors, Session Java Bean, Entity Java Bean, Message – Driven Bean, The JAR File. **JAVA INTERFACE DEFINITION LANGUAGE AND CORBA:** The Concept of Object Request Brokerage, Java IDL and CORBA, The IDL Interface, The Client Side, The Server Side, Running the Code. **JAVA REMOTE METHOD INVOCATION:** Remote Method Invocation Concept, Server Side, Client Side.
Text Books	The Complete Reference J2EE by Jim Keogh, Tata McGraw – Hill Edition.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understanding on J2EE Architectures, Client & Server communication process, software components, Servlets, JSP and CORBA	K2
CO2	Handle Errors and Exceptions in Web Applications	K3
CO3	Analyse effectiveness of creating dynamic web pages using Servlet and JSP	K4
CO4	Develops Web Applications using Java Servlet and JSP	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	-	2	3
CO2	2	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	-	-	-	-	-	-	-	-	2	2	-
CO4	-	-	3	-	-	-	-	-	-	-	2	-	-

1-Low, 2-Medium, 3-High

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Programme	M.Sc. Computer Science	Semester	Third		
Course Code	20RMSC304 (Elective)	Course Name	2. C# Programming		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. Design and Implement Windows Applications using Windows Forms. 2. Understand and implement string manipulation, exception handling within C# application environment. 3. Construct classes, methods, objects, inheritance and polymorphism. 4. Creating and scheduling threads in C#.				
UNIT -1	**Introducing C#:** What is C#, Why C#, Evaluation of C#, Characteristics of C#, Applications of C#, How does C# Differ from C++, How does C# Differ from Java. **Understanding .NET: The C# Environment**: The .NET Strategy, The Origins of .NET Technology, The .NET Framework, The Common Language Runtime, Framework Base Classes, User and Program Interfaces, Visual Studio .NET, .NET Languages, Benefits of the .NET Approach, C# and The .NET. **Overview of C#**: Introduction, A Simple C # Program, Namespaces, Adding Comments, Main Returning a Value, Using Aliases for Namespace Classes, Passing String Objects to WriteLine Method, Command Line Arguments, Main with a Class, Providing Interactive Input, Using Mathematical Functions, Multiple Main Methods, Compile Time Errors, Program Structure, Program Coding Style.				
	Literals, Variables and Data Types: Introduction, Literals, Variables, Data Types, Value Types, Reference Types, Declaration of Variables, Initialization of Variables, Default Values, Constant Variables, Scope of Variables, Boxing and Unboxing. **Operators and Expressions**: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions, Operator Precedence and Associativity, Mathematical Functions. **Decision Making and Branching**: Introduction, Decision Making with if Statement, Simple if Statement, the if... else Statement, Nesting of if... else Statement, The else if Ladder, Switch Statement, The ?: Operator. **Decision Making and Looping**: Introduction, The while Statement, The do Statement, The for Statement, The foreach Statement, Jumps in Loops				

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UNIT -2	**Methods in C#:** Introduction, Declaring Methods, The Main Method, Invoking Methods, Nesting of Methods, Method Parameters, Pass by Value, Pass by Reference, The Output Parameters, Variable Argument Lists, Methods Overloading. **Handling Arrays:** Introduction, One – Dimensional Arrays, Creating an Array, Two – Dimensional Arrays, The Simple . Array Class, ArrayList Class. **Manipulating Strings:** Introduction, Creating Strings, String Methods, Inserting Strings, Comparing Strings, Finding Substrings, Mutable Strings, Arrays of Strings, Regular Expressions. **Structures and Enumerations:** Introduction, Structures, Structs with Methods, Nested Structs, Difference Between Classes and Structs, Enumerations, Enumerator Initialization, Enumerator Base Types, Enumerator Type Conversion.
UNIT -3	**Classes and Objects:** Introduction, Basic Principles of OOP, Defining a Class, Adding Variables, Adding Methods, Member Access Modifiers, Creating Objects, Accessing Class Members, Constructors, Overloaded Constructors, Static Members, Static Constructors, Private Constructors, Copy Constructors, Destructors, Member Initialization, The this Reference, Nesting of Classes, Constant Members, Read – only Members, Properties, Indexers. **Inheritance and Polymorphism:** Introduction, Classical Inheritance, Containment Inheritance, Defining a Subclass, Visibility Control, Defining Subclass Constructors, Multiple Inheritance, Hierarchical Inheritance, Overriding Methods, Hiding Methods, Abstract Classes, Abstract Methods, Sealed Classes: Preventing Inheritance, Sealed Methods, Polymorphism. **Interface: Multiple Inheritance:** Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces, Interfaces and Inheritance, Explicit Interface Implementation, Abstract Class and Interfaces. **Operator Overloading:** Introduction, Overloadable Operators, Need for Operator Overloading, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Comparison Operators.

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UNIT -4	**Managing Errors and Exceptions:** Introduction, What is Debugging, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, The Exception Hierarchy, General Catch Handler, Using Finally Statement, Nested Try Blocks, Throwing Our Own Exceptions, Checked and Unchecked Operators, Using Exceptions for Debugging. **Multi threading in C#:** Introduction, Understanding the System, Threading Namespace, Creating and Starting a Thread, Scheduling a Thread, Synchronising Threads, Thread Pooling. **Window Forms and Web – based Application Development on .NET:** Introduction, Creating WindowForms, Customizing a Form, Understanding Microsoft Visual Studio, Creating and Running a SampleWinApp Windows Application, Overview of Design Patterns, Creating and Running a SampleWinApp2 Windows Application, Web – based Application on .NET.
Text Books	1. Programming in C#: A Primer Third Edition, E. Balagurusamy, Tata McGraw – Hill, Edition 2010.
References	

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand code solutions and compile C# projects within the .NET framework.	K2
CO2	Design and develop professional console and window based .NET application	K6
CO3	Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements (analysis)	K5
CO4	Construct classes, methods, and assessors, and instantiate objects.	K3

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	-	-	3
CO2	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	2	-	3	-	-	-	-	-	-	-	2	2	-

1-Low, 2-Medium, 3-High

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC304 (Elective)**	**Course Name**	**3. Software Testing**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the purpose of testing and taxonomy of Bugs. 2. To acquire knowledge on distinct types of testing methodologies. 3. To describe the principles and procedures for designing test cases. 4. To understand the stages of testing from Development to acceptance testing.				
UNIT -1	**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs. **Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.				
UNIT -2	**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.				
UNIT -3	**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.				
UNIT -4	**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. **Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.				
Text Books	1. Boris Beizer, "Software testing techniques", Dreamtech, second edition, 2002.				
References	1. Brian Marick, "The craft of software testing", Pearson Education. 2. Yogesh Singh, "Software Testing", Camebridge 3. P.C. Jorgensen, "Software Testing" 3rd edition, Aurbach Publications (Dist.by SPD). 4. N.Chauhan, "Software Testing", Oxford University Press. 5. P.Ammann&J.Offutt, "Introduction to Software Testing" , Cambridge Univ. Press. 6. Perry, "Effective methods of Software Testing", John Wiley, 2nd Edition, 1999.				

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Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Choose Test cases that are geared to discover the program defects.	K1
CO2	Design test cases before writing code and run these tests automatically.	K6
CO3	Apply test cases for testing different programming constructs.	K3
CO4	Test the applications using different testing methods and automation tools.	K4

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	3	-	-	2	2
CO2	2	3	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	3	3	-	-	-	-	-	-	-	-	3
CO4	-	-	-	2	-	-	-	-	-	-	-	-	2

1-Low, 2-Medium, 3-High

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC305 (Elective)**	**Course Name**	**1. Data Ming & Data Warehousing**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To learn data mining concepts and understand association rules mining. 2. To discuss classification algorithms learn how data is grouped using clustering techniques. 3. To develop the abilities of critical analysis to data mining systems and applications. 4. To implement practical and theoretical understanding of the technologies for data mining.				
UNIT -1	**Introduction:** Why Data Mining, What is Data Mining, What kind of Data can be Mined, Which Technologies are Used, Which Kinds of Applications are Targeted, Major Issues in Data Mining **Data Preprocessing**: Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Discretization.				
UNIT -2	**Data Warehousing and Online Analytical Processing:** Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute- Oriented Induction **Mining Frequent Patterns, Associations and Correlation: Basic Concepts** – Market Basket Analysis, Frequent Itemsets, Closed Itemsets and Association Rules; **Frequent Itemset Mining Methods:** Apriori Algorithms, Generating Association Rules from Frequent Itemsets, Improving the efficiency of Apriori, Pattern-Growth Approach for Mining Frequent Items, Mining Frequent Items using Vertical Data Format, Mining Closed and Max Patterns. **Which Patterns are Interesting? :** Strong Rules are not necessarily Interesting, From Association Analysis to Correlation Analysis, Comparison of Pattern Evaluation Measures.				
UNIT -3	**Classification: Basic Concepts** - Definition, General Approaches to Classification; **Classification Techniques:** Decision Tree Induction,Bayes Classification Methods, Rule Based Classification, Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, Classification using Frequent Patterns, K- Nearest neighbour classification. **Model Evaluation and Selection, Techniques to Improve Classification Accuracy:** Bagging, Boosting and AdaBoost, Random Forest.				

UNIT -4	**Clustering:** Problem Definition, Requirements for Cluster Analysis, Clustering Overview. **Partitioning Methods**: K-Means, K-Medoids **Hierarchical Methods**: Agglomerative Methods and Divisive, Distance Measures in Algorithmic Methods, BIRCH, Chameleon, Probabilistic Hierarchical Model. **Density-Based Methods-** DBSCAN, **Density-Based Methods** – STING, CLIQUE. **Evaluation of Clustering** **Web and Text Mining:** Introduction, Web Mining, Web Content Mining, Web Structure Mining, we usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.
Text Books	Data Mining- Concepts and Techniques- Jiawei Han, MichelineKamber, Morgan Kaufmann Publishers, Elsevier, Edition, 2006.
References	1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press. 2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education. 3. Data mining Techniques and Applications, Hongbo Du Cengage India Publishing.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system	K2
CO2	Choose and employ suitable data mining algorithms to solve real world problems in business and scientific information using data mining	K1
CO3	Ability to apply the concepts, algorithm, techniques and tools for developing practical applications	K3
CO4	Ability to classify webpages, extracting knowledge from the web	K4

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	-	3	-	-	-	-	-	-	-	2	-	-
CO2	-	3	2	-	-	-	-	-	-	-	2	-	3
CO3	-	3	2	-	-	-	-	-	-	-	-	2	-
CO4	3		2	-	-	-	-	-	-	-	-	-	-
1-Low, 2-Medium, 3-High													

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC305 (Elective)**	**Course Name**	**2. Cryptography and Network Security**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. To understand the importance and application of each of confidentiality, integrity, authentication and availability. 2. To understand various cryptographic algorithms and public-key cryptosystem. 3. To understand the basic categories of threats to computers and networks and Intrusions and intrusion detection. 4. To understand the enhancements made to IPv4 by IPSec.				
UNIT -1	**ATTACKS ON COMPUTERS AND COMPUTER SECURITY:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security. **CRYPTOGRAPHY: CONCEPTS AND TECHNIQUES:** Introduction, plaintext and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.				
UNIT -2	**SYMMETRIC KEY CIPHERS:** Block Cipher principles &Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution. **ASYMMETRIC KEY CIPHERS:** Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman,ECC), Key Distribution.				
UNIT -3	**MESSAGE AUTHENTICATION ALGORITHMS AND HASH FUNCTIONS:** Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.				
UNIT -4	**E-MAIL SECURITY:** Pretty Good Privacy, S/MIME. **IP SECURITY:** IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management. **WEB SECURITY:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.				

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Text Books	1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011. 2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Mc Graw Hill, 2010. 3. Bernard Menezes "Network Security and Cryptography", 1stEdition, CENGAGE Learning, 2010.
References	1. C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, "Cryptography and Network Security",1st Edition, Wiley India Pvt Ltd, 2011. 2. ForouzanMukhopadhyay "Cryptography and Network Security", 2nd Edition , Mc Graw Hill, 2010. 3. Mark Stamp, Wiley India, "Information Security, Principles and Practice", 2nd Edition, Wiley, 2011.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	K2
CO2	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes	K3
CO3	analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP	K4
CO4	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	2	-	1
CO2	-	3	3	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	2	-	-	-	-	-	-	-	3	-	-

1-Low, 2-Medium, 3-High

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Programme	**M.Sc. Computer Science**	**Semester**	**Third**		
Course Code	**20RMSC305 (Elective)**	**Course Name**	**3. Computer Graphics**		
Course Category	Core	Hours/Week	L	T	P
			3	1	0
		Credits	4		
Course Objectives	1. Understand the need of developing graphics application. 2. To understand graphical techniques such as modelling, representation, illumination, shadowing, rendering and texturing. 3. Learn algorithmic development of graphics primitives like: line, circle, polygon etc. 4. To learn two dimensional and three dimensional computer graphics with comprehend advanced software tools of computer graphics.				
UNIT -1	**A Survey of Computer Graphics:** Computer – Aided Design, Presentation Graphics, Computer Art, Entertainment, Education and Training, Visualization, Image Processing, Graphical User Interfaces. **Overview of Graphics Systems:** Video Display Devices, Raster – Scan Systems, Random - Scan Systems, Graphics Monitors and Workstations, Input Devices, Hard – Copy Devices, Graphics Software. **Output Primitives:** Points and Lines, Line – Drawing Algorithms, Loading the Frame Buffer, Line Function, Circle – Generating Algorithms, Ellipse – Generating Algorithms, Filled – Area Primitives.				
UNIT -2	**Two – Dimensional Geometric Transformations:** Basic Transformations, Matrix Representations and Homogeneous Coordinates, Composite Transformations, Other Transformations, Transformations Between Coordinate Systems. **Two – Dimensional Viewing:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window – to – Viewport Coordinate Transformation, Two – Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping.				
UNIT -3	**Three – Dimensional Object Representations:** Polygon Surfaces, Curved Lines and Surfaces, Quadric Surfaces, Superquadrics, Blobby Objects, Spline Representations, Cubic Spline Interpolation Methods, Bezier Curves and Surfaces, B – Spline Curves and Surfaces. **Three – Dimensional Geometric and Modeling Transformations:** Translation, Rotation, Scaling, Other Transformations.				

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UNIT -4	**Three – Dimensional Viewing:** Viewing Pipeline, Viewing Coordinates, Projections, View Volumes and General Projection Transformations, Clipping. **Visible – Surface Detection Methods:** Classification of Visible - Surface Detection Algorithms, Back – Face Detection, Depth – Buffer Method, A – Buffer Method, Scan – Line Method, Depth – Sorting Method, BSP – Tree Method, Area – Subdivision Method.
Text Books	1. "Computer Graphics C version", Donald Hearn and M.Pauline Baker, Pearson Education.
References	1. "Computer Graphics Principles & practice", Second Edition in C, James D. Foley, Andries VanDam, Steven K. Feiner and John F. Hughes, Pearson Education. 2. "Computer Graphics", Second Edition, Donald Hearn and M.Pauline Baker, PHI Education.

Course Outcomes : After completion of the course student able to

	Course Outcome Description	Knowledge Level
CO1	Understand mathematical basics which are used in computer graphics and also learn how to use them in designing computer graphics programs.	K2
CO2	Analyse basic graphics principles which are used in games, animations and film making.	K4
CO3	Apply geometric transformations on graphics objects and their application in composite form	K3
CO4	Choose scene with different clipping methods and its transformation to graphics display device	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	-	-	-	-	-	3	-	3	-	-
CO2	2	-	2	-	-	-	-	-	-	-	2	2	-
CO3	2	2	3	-	-	-	-	-	-	-	-	2	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	2
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Third		
Course Code	20R MSC302P	Course Name	Web Technologies Lab		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. a) Write a HTML5 Program to create hyperlinks to four websites.
   b) Write a HTML5 Program to link an email address.
2. Write a HTML5 Program to include images to web pages.
3. Write a HTML5 Program to create complex table.
4. Write a HTML5 Program to insert special characters in the document.
5. Write a HTML5 Program to adding background images and indentation using CSS
6. Write a HTML5 Program to link an internal style sheet.
7. Create an simple animator of an image that moves in a diamond pattern as its changes opacity.
8. Write a HTML5 Program to skewing and transforming elements in CSS.
9. Write a HTML5 Program to add an image and float the text around the image
10. Write a HTML5 Program to multi column text layout.
11. Write a HTML5 Program to create website registration form with optional survey.
12. Create an auto complete input element with an associated data list that contains days of the week.
13. Write a HTML5 Program to absolute positioning of an element.
14. Link HTML5 page to extend CSS file.
15. Draw a rectangle with a border on a canvas.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	Knowledge Level
CO1	Analyze a web page and identify its elements and attributes.	K4
CO2	Demonstrate the ability to retrieve data from a database and present it in a web page.	K2
CO3	Create dynamic web pages using JavaScript (Client side programming).	K3
CO4	Create XML documents and Schemas	K6

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	-	-	-	-	-	-	2	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	2
CO3	2	-	3	-	-	-	-	-	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	-	-	-	-	2
1-Low, 2-Medium, 3-High													

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Programme	M.Sc. Computer Science	Semester	Third		
Course Code	20R MSC303P	Course Name	Programming using PHP Lab		
Course Category	Core	Hours/Week	L	T	P
			0	0	4
		Credits	2		

List of Programmes

1. Get name of the user from a form and show greeting text.
2. Write a php program to check whether given number is palindrome or not.
3. Write a php program to find largest values of two numbers using nesting of function.
4. Write a Mathematical calculator program.
5. Write a php program using function.
6. Create a PHP page for login page without sql connection.
7. Write a php program to Array manipulation.
8. Write a php program to design personal information
9. Create a PHP page for login page with sql connection.
10. Write a php program to Read from existing file
11. Write a php program to calculate Date and Time function .
12. Write a php program to design Curriculum Vitae.
13. Write a php program hit counter using cookies.
14. Create a web page to advertise a product of the company using images and audio.
15. Create a web page for Travel agency.
16. Create a web page for software company wesites.
17. Create a PHP page for login system using session.

Course Outcomes : After completion of the course student able to write programs

	Course Outcome Description	Knowledge Level
CO1	Understand Arrays, Operators,	K2
CO2	Create PHP Pages for different applications	K6
CO3	Define PHP Sessions to create Webpages	K1
CO4	Apply various PHP library functions that manipulate files and directories.	K3

K1- Remembering, K2- Understanding, K3- Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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COURSE AND PROGRAMME OUTCOMES MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	-	3	2	-	-	-	-	-	-	-	-	2	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	2
CO3	2	-	3	-	-	-	-	-	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	-	-	-	-	2
1-Low, 2-Medium, 3-High													

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M.Sc. (COMPUTER SCIENCE) - MODEL QUESTION PAPER

Time: 3 hrs. Max Marks: 70

SECTION – A		**5 X6 = 30Marks**
*Answer any **FIVE** of the following Questions. Each question carries 5 marks.*		
1		
2		
3		
4		
5		
6		
7		
8		
SECTION – B		**4 X10 = 40 Marks**
*Answer any **Four** of the following Questions. Each question carries 10 marks.*		
9		
10		
11		
12		
13		
14		
15		
16		

Note: Instructions to the paper setters to give two questions from each unit.

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