Semester - 3

						Internal Marks			External Marks		Passing Marks (Theory + CE)	Passing Marks (Practical)	Total Marks
Code	**Subject**	Credit	Lect	Lab	Tut	T	P	CE	T	P	Int. + Ext.	Int. + Ext.	
303105201	Design of Data Structures	3.00	3	0	0	20	-	20	60	-	40	-	100
303105202	Design of Data Structures Laboratory	2.00	0	4	0	-	20	-	-	30	-	25	50
303105203	Database Management System	3.00	3	0	0	20	-	20	60	-	40	-	100
303105204	Database Management System Laboratory	1.00	0	2	0	-	20	-	-	30	-	25	50
303105205	Object Oriented Programming with JAVA	2.00	2	0	0	20	-	20	60	-	40	-	100
303105206	Object Oriented Programming with JAVA Laboratory	1.00	0	2	0	-	20	-	-	30	-	25	50
303105220	Digital Electronics	3.00	3	0	0	20	-	20	60	-	40	-	100
303105221	Digital Electronics Laboratory	1.00	0	2	0	-	20	-	-	30	-	25	50
303191202	Discrete Mathematics	4.00	4	-	-	20	-	20	60	-	40	-	100
303193203	Professional Communication Skills	2.00	-	-	2	-	-	100	-	-	40	-	100
	Total	22.00	15	10	2								800

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **T** - Theory, **P** - Practical, **CE** - CE, **T** - Theory, **P** - Practical

eory Passing % : 40 **Practical Passing % :** 50

303105201 - Design of Data Structures

Course	Bachelor of Technology (BTech)	**Semester - 3**
Type of Course	-	
Prerequisite	Computer Programming and Basic Syntaxes	
Course Objective	Data structure is a subject of primary importance in Information and Communication Technology. Organizing or structuring data is important for implementation of efficient algorithms and program development. Efficient problem solving needs the application of appropriate data structure during program development.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
3	0	0	3.00	60	20	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
1	**Introduction:** Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, dynamically allocated arrays. Performance analysis of an algorithm and space and time complexities	6	10
2	**Stacks, Recursion and Queue:** **Stacks:** Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression. **Recursion -**Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, **Queues:** Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Deque, Priority Queues and its problems	8	15
3	**Linked Lists:** Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists	5	10
4	**Searching and Sorting:** Interpolation Search **Sorts:** Selection Sort Insertion Sort Bubble Sort Quick Sort Merge Sort, Radix Sort	5	10
5	**Trees :** Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - In Order, Post Order, Pre Order; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression	4	10

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
6	**Red Black Trees and AVL Trees:** Introduction-Operations on Red Black Trees AVL tree Construction Operations on AVL Trees	8	15
7	**Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing	3	15
8	**Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search.	5	15
Total		**44**	**100**

Course Outcomes

At the end of this course, students will be able to:	
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues
CO3	Describe the hash function and concepts of collision and its resolution methods
CO4	Solve problem involving graphs, trees and heaps
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

Reference Books

1.	**Fundamentals of Data Structures in C, 2ND eDITION, E.Horowitz, S,.Sahni and Susan Anderson- Freed, Universities Press (TextBook)**
2.	**Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.**

303105202 - Design of Data Structures Laboratory

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic knowledge of Data Structures	
Course Objective	This course provides a broad introduction to Data Structures The various Data structures and its analysis of working design and development.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
0	0	4	2.00	-	-	30	20	50

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

List of Practical	
1.	**Implement Stack and its operations like (creation push pop traverse peek search) using linear data structure**
2.	**Implement Infix to Postfix Expression Conversion using Stack**
3.	**Implement Postfix evaluation using Stack.**
4.	**Implement Towers of Hanoi using Stack.**
5.	**Implement queue and its operations like enqueue, dequeue, traverse, search.**
6.	**Implement Single Linked lists and its operations(creation insertion deletion traversal search reverse)**
7.	**Implement Double Linked lists and its operations(creation insertion deletion traversal search reverse)**
8.	**Implement binary search and interpolation search.**
9.	**Implement Bubble sort, selection sort, Insertion sort, quick sort ,merge sort.**
10.	**Implement Binary search Tree and its operations (creation, insertion, deletion).**
11.	**Implement Traversals Preorder Inorder Postorder on BST.**
12.	**Implement Graphs and represent using adjaceny list and adjacency matrix and implement basic operations with traversals (BFS and DFS).**

303105203 - Database Management System

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic Computer Knowledge	
Course Objective	The course will enable students to understand the different issues involved in the design and implementation of a database system as well execute various database queries using SQL.	

Teaching Scheme (Contact Hours)				**Examination Scheme**				
				Theory Marks		**Practical Marks**		
Lecture	**Tutorial**	**Lab**	**Credit**	**External Marks**	**Internal Marks**	**External Marks**	**Internal Marks**	**Total Marks**
3	0	0	3.00	60	20	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	**Topics**	**T**	**W**
1	**Introduction:** Introduction and applications of DBMS, File Processing System and its limitations, ANSI/SPARC Model, Data Independence, Client-Server Architecture, Users & DBA, Database Architecture.	**3**	**10**
2	**SQL:** Data Definition Language (DDL) commands, Data Manipulation Language (DML) commands, Data Control Language (DCL) commands, Transaction Control Language (TCL) commands. **Predicates & Clauses:** Logical Operators (AND / OR), Relational Operators, BETWEEN Predicate, IN & NOT IN Predicate, LIKE Predicate. **Functions in SQL**: Aggregate Functions, Character Functions, Arithmetic Functions, Date Functions, Conversion Functions.	**4**	**10**
3	**Data Models:** Hierarchical Model, Network Model, Relational Model, Object Oriented Model. **E-R Diagram:** Introduction to E-R Diagram, Entities, Attributes & its types, Relationships, Mapping Cardinalities, Participation Constraints, Weak Entity Sets, Specialization, Generalization, Aggregation.	**5**	**10**
4	**Relational Data Model:** **Relational Data Model:** Introduction, Degree, Cardinality. **Constraints & Keys:** Primary Key, Foreign Key, Super Key, Candidate Key, Not Null Constraint, Check Constraint. **Relational Algebra Operations:** Selection, Projection, Cross-Product, Rename, Joins (Natural & Outer Join), Set Operators (Union, Intersection, Set Difference), Aggregate Functions.	**4**	**10**
5	**Relational Database Design:** Functional Dependency – definition, trivial and non-trivial FD, Armstrong's Axioms/Inference Rules, Closure of FD, Closure of Attributes, Candidate Key, Finding a Candidate Key, Decomposition (Lossy & Lossless), Database Anomalies, Normalization – 1Nf, 2NF, 3NF, BCNF, 4NF, 5NF	**6**	**20**

Course Content	**T** - Teaching Hours | **W** – Weightage		
Sr.	**Topics**	**T**	**W**
6	**Transaction:** **Transaction:** Introduction, ACID Properties, Transaction Life Cycle, Scheduling, Serial Schedule, Interleaved Schedule, Transaction Operations, Serializability (View & Conflict), Two-Phase Commit Protocol. **Database Recovery:** Introduction, Log Based Recovery, Shadow Paging, Checkpoints. **Concurrency Control:** Introduction, Lock Based Protocol, Two Phase Lock Protocol, Intention Locking, Multiple Granularity, Time-based Protocol. **Deadlock:** Introduction, Deadlock Detection, Deadlock Recovery, Deadlock Prevention (Wait-Die, Wound-Wait & Timeout-Based Approach).	**12**	**20**
7	**Query Processing:** **Query Processing:** Introduction, Layers of Query Processing, Measures of Query Cost, File Scans (Linear & Binary Search), Materialized View, Pipelining. **Query Optimization:** Introduction, Equivalence Rules, Cost-Based Query Optimization.	**3**	**10**
8	**Security:** **Security:** Data Security, Data Integrity, Authentication, Authorization, Encryption, Decryption, Access Control (DAC, RBAC, MAC), Intrusion Detection, SQL Injection	**2**	**5**
9	**PL/SQL Concepts:** Views, PL/SQL Block, Cursors, Triggers, Stored Procedures, Store Functions	**3**	**5**
Total		**42**	**100**

Reference Books	
1.	**Database System Concepts (TextBook)** Abraham Silberschatz, Henry Korth, S. Sudarshan; McGraw Hill International; 6th Edition
2.	**An Introduction to Database Systems** C. J. Date, A. Kannan, S. Swamynathan; Pearson Education; 8th Edition
3.	**SQL, PL/SQL – The Programming Language** Ivan Bayross; BPB Publications

303105204 - Database Management System Laboratory

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic Computer Knowledge	
Course Objective	The course will enable students to understand the different issues involved in the design and implementation of a database system as well execute various database queries using SQL.	

Teaching Scheme (Contact Hours)				**Examination Scheme**				
				Theory Marks		**Practical Marks**		
Lecture	**Tutorial**	**Lab**	**Credit**	**External Marks**	**Internal Marks**	**External Marks**	**Internal Marks**	**Total Marks**
0	0	2	1.00	-	-	30	20	50

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

List of Practical

1.

1. What is DBMS? Explain advantages of DBMS over FPS.
2. List 15 applications of Database.Explain any 2 how Database can be helpful in managing that application?
3. Create the Database for the following:

    1. Student Details using Excel.
    2. Employees Details using MS Access
    3. Facebook using Excel

2.

Create following Tables:

- Use **varchar2(30)** datatype for **Alphanumeric Characters and Special Symbols, number** datatype for **Numbers, date datatype for Date.**
- **Insert proper data (Capital and Small Case) as mentioned in this file.**
- **Employee**
- **Emp_name Street City** Adam Spring Pittsfield Brooks Senator Brooklyn Curry North Rye Demalo SunShine San Deago

3.	**Simple Queries:** 1. Describe deposit, branch. 2. Describe borrow, customers. 3. List all data from table DEPOSIT. 4. List all data from table BORROW. 5. List all data from table CUSTOMERS. 6. List all data from table BRANCH. 7. Give account no and amount of depositors. 8. List all data from SAILORS. 9. List Boat Name and its color. 10. List Employee name and its city. 11. List all the details of Clients. 12. Describe various products and its price. 13. Describe sailor's name, age and its rating. 14. Describe the managers of various employees 15. Describe the details of Loan for customers. 16. Describe the date of travel of various sailors.
4.	**Simple Queries:** (1) Give name of depositors having amount greater than 4000. (2) List the employees having salary less than 22000. (3) List the sailors having age more than 25. (4) List the boats travelling on 10-oct-98 (5) List the details of boat "Interlake". (6) List the details of the red colored boat. (7) List the details of clients whose city is Mumbai (8) List Client Name, due balance and city of the clients having balance greater than 1500. (9) Describe the details of products having selling price less than 500. (10) List the products for which quantity ordered is less than 120 and cost price is greater than 250. (11) Display account details having amount greater 2200. (12) Display all the customers staying in Nagpur (13) Display the names of sailors having rating greater than 7 (14) Display the orders made in the month of June (15) List all the accounts created in the month of March
5.	**"Like" Queries:** 1. Display all customers whose name start with 'M'. 2. Display all the customers whose name ends with 'L'. 3. Display all loan details whose branch starts with 'A'. 4. Display the details of sailors whose name is minimum 6 characters long. 5. Display the details of Employees whose address starts with 'S'. 6. List the details of the boat ending with 'e'. 7. List the details of clients having 'h' as a 3rd character in his/her name. 8. List Client Name, due balance and city whose pin code starts with 4. 9. List all customers whose city contains 'a' as second character. 10. List client names and city whose state has 'a' as fourth or fifth character.
6.	**"Aggregate Functions & DML" Queries:** 1. List total deposit from deposit.. 2. Give Maximum loan given to a customer. 3. Describe the average age of all the sailors. 4. Count total number of customers 5. Count total number of customer's cities. 6. Display total target for the salesman. 7. Update the salary of the employee having 10000 to 11500 8. Update the city of client from Bangalore to Bengaluru.

	9. Give the 15% hike in the salary of all the Employees. Rename that column to "New Salary". 10. Increase the sell price of all products by 20% and label new column as "New Sell Price". (Do not update the table) 11. Provide the count of customers staying in "Bombay"
7.	**"Join" Queries:** 1. Find the salary of Adam. 2. Find the city where Brooks work. 3. Display the sailor's details whose boat is booked for 9th May, 98. 4. Display the day of ride and sailor name for boat 103. 5. Display the sailor name and its age for Red colored and 101 boat. 6. Display the sailor details whose boat is never booked. 7. Display the sailor name that has Red or Green Boat. 8. Display all sailor details and boat details and who has Interlake boat. 9. Display sailor's rating with boat details or the trip on 10th October, 98. 10. Display the sailor id and name whose age is more than 42 or who has Blue colored boat. 11. Display name and rating of sailor whose boat name is Clipper. 12. List products whose selling price is more than 500 and less than equal to 750. 13. Describe the second highest salary of an employee. 14. Display the date of travel and sailor's name whose age is between 35 and 65. 15. List all the employees working for "FBC".
8.	**"Join" Queries:** 1. Display all the employee name and the city where they work. 2. Display the employee name and company's name having salary more than 15000. 3. Find the average rating and age of all sailors. 4. List various products available. 5. Display the names of salesman who have salary more than 2850. 6. Change the cost price of Trousers to 950 7. List all the clients having "a" as a second character in their names. 8. List all the products whose QtyonHand is less than Reorderlvl. 9. Print the description and total qty sold for each product. 10. Find out all the products which have been sold to "Ivan Bayross". 11. Find the names of all clients who have purchased Trousers. 12. Find the products and their quantities for the orders placed by client C00001 and C00002. 13. List the client details who place order no. O19001. 14. List the name of clients who have placed orders worth Rs. 10000 or more. 15. Find the total of Qty ordered for each Order.
9.	**"Miscellaneous" Queries:** 1. Find the average rate for each Order. 2. Give the loan details of all the customers. 3. List the customer name having loan account in the same branch city they live in. 4. Provide the loan details of all the customers who have opened their accounts after August'95. 5. List the order information for client C00001 and C00002. 6. List all the information for the order placed in the month of june. 7. List the details of clients who do not stay in Maharashtra. 8. Determine the maximum and minimum product price. Rename the output as "Max_Price" and "Min_Price". 9. Count the number of products having price less than or equal to 500. 10. List the order number and the day on which client placed an order. 11. List the month and the date on which an order is to be delivered. 12. List the date, 25 days after today's date. 13. Find the total of all the billed orders in the month of June. 14. List the products and orders from customers who have ordered less than 5 units of "Pull Overs". 15. Find the list of products and orders placed by "Ivan Bayrosss" and "Mamta Muzumdar". 16. List the clients who placed order before June'04. 17. List all the clients who stays in "Bengaluru" or "Mangalore".

10.	**PL/SQL Block:** 1. Write a PL/SQL Block to Add 2 Numbers 2. Write a PL/SQL Block to find Area of Rectangle, Triangle and Square. 3. Write a PL/SQL Block to find Maximum of 3 numbers 4. Write a PL/SQL Block to print sum of N Numbers using For Loop. 5. Write a PL/SQL Block to generate Fibonacci series of N numbers

303105205 - Object Oriented Programming with JAVA

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic knowledge of software applications	
Course Objective	This course provides a broad introduction to software engineering. The various process models required to develop software is also being described. Moreover the functional and non-functional requirements are also described.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
2	0	0	2.00	60	20	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
1	**Design introduction:** Object-oriented programming, oops principles, encapsulation, inheritance and polymorphism java as a oops & internet enabled language, importance of java, java usage in industry, the byte code, compiling, and running of simple java program, jvm, jdk, jre	4	8
2	**Data types, variable, operators:** Data types, variables, dynamic initialization, scope and lifetime of variables, type conversion and casting, operators	4	10
3	**Control statements:** Conditional Statements, Looping Statements, Jump Statements	5	10
4	**Arrays:** Array, Array values and memory storage Structure, Types of Arrays.	4	8
5	**Object oriented programming:** Classes and objects: concepts of classes and objects, declaring objects, assigning object reference variables, methods, constructors, access control, garbage collection, usage of static with data and methods, usage of final with data, overloading methods and constructors, parameter passing - call by value, recursion, nested classes.	9	18
6	**Inheritance:** Inheritance Basics, member access rules, Usage of super key word, forms of inheritance, Method Overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance	2	8
7	**Strings, Packages and Interfaces:** String handling functions, Packages, Class path, importing packages, differences between classes and interfaces, Implementing & Applying interface, enumerations in java.	5	12
8	**Exception Handling:** Exceptions, Types of Exceptions, Handling of Exceptions	3	8

Course Content	**T** - Teaching Hours | **W** – Weightage		
Sr.	**Topics**	**T**	**W**
9	**Multi Threading:** Thread, Usage of threads, Types of threads, Handling Threads	**4**	**10**
10	**Collections Framework:** Functional Programming, Collections, Hierarchy of collections	**8**	**5**
Total		**48**	**97**

Course Outcomes	
At the end of this course, students will be able to:	
CO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
CO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc
CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
CO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
CO5	Demonstrate the use of various OOPs concepts with the help of programs

Reference Books	
1.	**Introduction to Java Programming (Comprehensive Version) Daniel Liang; Pearson (TextBook)**
2.	**Core Java Volume-II Fundamentals Horstmann & Cornell; Pearson**
3.	**Complete Reference Java 2 Herbert Schildt; TMH**

303105206 - Object Oriented Programming with JAVA Laboratory

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic knowledge of software applications	
Course Objective	This course provides a broad introduction to software engineering. The various process models required to develop software is also being described. Moreover the functional and non-functional requirements are also described.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
0	0	2	1.00	-	-	30	20	50

SEE *- Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

List of Practical	
1.	**write a program to display Hello World message in console window.**
2.	**Write a program to perform arithmetic and bitwise operations in a single source program without object creation.**
3.	**Write a program to perform arithmetic and bitwise operations by creating individual methods and classes than create an object to execute the individual methods of each operation.**
4.	**Write a java program to display the employee details using Scanner class.**
5.	**Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions?**
6.	**The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non- recursive functions to print the nth value of the Fibonacci sequence?**
7.	**Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?**
8.	**Write a Java program to multiply two given matrices?**
9.	**Write a Java program for sorting a given list of names in ascending order?**
10.	**Write a java program for Method overloading and Constructor overloading**
11.	**Write a java program to represent Abstract class with example.**
12.	**Write a program to implement multiple Inheritances.**
13.	**write program to demonstrate method overriding and super keyword.**
14.	**Write a java program to implement Interface using extends keyword.**
15.	**Write a java program to create inner classes.**
16.	**Write a java program to create user defined package.**
17.	**Write a Java program that displays the number of characters, lines and words in a text?**
18.	**Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?**

19.	**Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (Use StringTokenizer class)?**
20.	**Write a java program for creating single try block with multiple catch blocks.**
21.	**write a program for multiple try blocks and multiple catch blocks including finally.**
22.	**write a program to create user defined exception.**
23.	**Write a java program for producer and consumer problem using Threads.**
24.	**Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.**
25.	**write a program to create dynamic array using ArrayList class and the print the contents of the array object.**
26.	**Write programs to implement add, search and remove operation on ArrayList object.**

303191202 - Discrete Mathematics

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Basic Concepts of Set Theory, Function	
Course Objective	The course provides a mathematical background related to Computer engineering.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
4	-	-	4.00	60	20	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
1	**UNIT 1**	6	11
	Sets, Relation and Function: Cartesian products, Binary relation, Partial ordering relation, Equivalence relation, Size of a set, Finite and infinite sets, Countable and uncountable Sets, Cantor's diagonal argument, The power Set theorem, Schroeder-Bernstein theorem, **Lattices:** Definitions and properties, Hasse diagrams, and examples		
2	**UNIT 2**	5	9
	Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The division algorithm: Prime Numbers, The greatest common Divisor: Euclidean Algorithm, The fundamental theorem of arithmetic. Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.		
3	**UNIT 3**	11	18
	Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: the laws of logic, logical implication, Rules of inference, The use of quantifiers **Proof Techniques:** Some terminology, Proof methods and Strategies, Forward Proof, Proof by contradiction, Proof by contraposition, Proof of necessity and sufficiency.		
4	**UNIT 4**	24	40
	Algebraic Structures and Morphism: Algebraic Structures with one binary operation, Semi groups, Monoids, Groups, Congruence relation and Quotient structures, Free and cyclic groups, Permutation groups, Substructures, Normal subgroups, Algebraic structures with two binary operation, Rings, Integral domain and Fields. Boolean algebra and Boolean ring, Identities of boolean algebra, duality, Representation of boolean function, Disjunctive and conjunctive normal form.		
5	**UNIT 5**	14	22
	Graphs and Trees: Graphs and their properties, Degree, connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian walks, Graph colouring, colouring maps and Planar graphs, colouring vertices, colouring edges, List colouring, Perfect graph, definition properties and example, Rooted trees and sorting, Weighted trees and Prefix codes, Bi-connected component and Articulation Points, Shortest distances.		
Total		**60**	**100**

Reference Books	
1.	**Discrete Mathematics and its Applications (TextBook)** Kenneth H. Rosen; Tata McGraw – Hill
2.	**Discrete Mathematics** Norman L. Biggs; Oxford University Press; 2nd Edition
3.	**Discrete Mathematical Structures with Applications to Computer Science (TextBook)** J.P.Tremblay and R. Manohar; Tata McGraw-Hill
4.	**Discrete Mathematics with Applications (TextBook)** Susanna S. Epp; Wadsworth Publishing Co. Inc.; 4
5.	**Elements of Discrete Mathematics A Computer Oriented Approach (TextBook)** C. L. Liu and D P Mohapatra; Tata McGraw – Hill; 3

303193203 - Professional Communication Skills

Course	Bachelor of Technology (BTech)	**Semester – 3**
Type of Course	-	
Prerequisite	Knowledge of English language in practical life	
Course Objective	Knowledge and application of English, Aptitude and Management Skills are crucial for better employability as well as professionalism	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
-	2	-	2.00	-	-	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** – Weightage

Sr.	Topics	T	W
1	**Technical Writing: Email etiquette & Email writing Letter Writing** **(Types of Letters & Layout)**: • Trains students on detailed email and letter writing • Students will be able to write formal letters following certain stipulated formats. They will learn different types of letters for different official purposes.	4	10
2	**Interpersonal Communication at Workplace: Dynamics of communication** • To develop the confidence to handle a wide range of demanding situation more effectively at the workplace • To enable the students to analyse their own interpersonal communication style.	2	10
3	**Debate: The three minute debate planner** • To enable the students to generate effective critical thinking into primary issues in the given topic. • Students will be able to resolve controversies and recognize strengths and weaknesses of arguments.	4	10
4	**Goal setting & Tracking** To enable the students to define strategies or implementation steps to attain the identified goals and make progress every day.	2	10
5	**Time Management & Task Planning (Case –study)** • To enable the students to identify their own time wasters and adopt strategies to reduce them. • To enable students to clarify and priorities their objective and goals by creating more planning time	2	5
6	**Reading Comprehension: Intermediate level** To enable the students develop the knowledge, skills, and strategies they must possess to become proficient and independent readers	2	5
7	**Listening Skills: Small everyday conversation & comprehension** • Provides practice on understanding accents and day to day • Listening to English conversations in different context.	2	10
8	**Information design and writing for print and online media: Blog Writing** • To enable students to design information that is targeted to specific audiences in specific situation to meet defined objectives. • To create blogs and share their own knowledge and experience to the world.	2	5
9	**Advanced vocabulary Building**	4	10

Course Content	**T** - Teaching Hours | **W** - Weightage		
Sr.	**Topics**	**T**	**W**
	• The students will expand their vocabulary so as to enhance their proficiency in reading and listening to academic texts, writing, and • The students will attain vocabulary to comprehend academic and social reading and listening • The students will develop adequate speaking skills to communicate effectively.		
10	**Picture Perception** To prepare the students for a test for basic intelligence and IQ, generally done on the first day of SSB (Sashastra Seema Bal is one of India's Central Armed Police Forces)	**1**	**5**
11	**Appreciation, Apology and Acknowledgement letters** • To enable the students to maintain productive business relationship through different types of letters. • To enable the students to express their feelings without speaking out loud.	**2**	**10**
12	**The Art of Negotiation** • To enable the students to reach an agreement for mutual benefits through negotiation. • To enable the students to learn a process by which compromise or agreement is reached while avoiding argument and dispute	**2**	**5**
13	**Activity Session (Game of Truth)** • To make the students think of significance of certain things in their life. • To make them share their thoughts and perception of matters in life, with others.	**1**	**0**
Total		**30**	**95**

Reference Books	
1.	**Business Correspondence and Report Writing** SHARMA, R. AND MOHAN, K.
2.	**Communication Skills 2011** Kumar S and Lata P; Oxford University Press
3.	**Practical English Usage** MICHAEL SWAN
4.	**A Remedial English Grammar for Foreign Student** F.T. WOOD
5.	**On Writing Well** William Zinsser; Harper Paperbacks,2006; 30th anniversary edition
6.	**Oxford Practice Grammar,** John Eastwood; Oxford University Press
7.	**Quantitative Aptitude for Competitive Examinations** Dr. R.S. Aggarwal

303105220 - Digital Electronics

Course	Bachelor of Technology (BTech)	**Semester - 3**
Type of Course	-	
Prerequisite	Basic Electronics	
Course Objective	This course is design to provide basic ideas of computer architecture. This course also makes help to understand organization and architecture of computer. It will help to develop their logical abilities.	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
3	0	0	3.00	60	20	-	-	100

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content **T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Fundamentals of Digital Systems and logicfamilies :**Digital signals, digital circuits, Number Systems:binary, signed binary, octal, hexadecimal number, binary arithmetic, onės and twȯs complements arithmetic, codes, BCD arithmetic ,error detecting and correcting codes, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, examples of IC gates, characteristics of digital lCs, Digital Logic families:TTL and CMOS logic, interfacing CMOS and TTL.	15	7
2	**Minimization Techniques:**Boolean Algebra, Boolean postulates and laws, De-Morgaṅs Theorem, Principle of Duality, Boolean expression, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), K-map representation, simplification and minimization of logic functions using K-map. Doṅt care conditions and Quine-McCluskey Method of minimization. Variable Entered Maps, Realizing Logic Function with Gates.	20	8
3	Combinational Digital Circuits:Binary Adders and Subtractors, Parallel binary adder & subtractor, Serial adder, BCD adder, Carry look ahead adder, Multiplexer/De Multiplexer, Encoder/Decoders, Popular MSI chips, Magnitude comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices.	20	9
4	**SEQUENTIAL CIRCUITS**:A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and Dtypesflip flops, applications of flipflops, shift registers, Applications of shift registers, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters,special counter IC̣s, asynchronous sequential counters, applications ofcounters.	20	9
5	**A/D and D/A Converters**:Digital to analog converters: weighted resistor/converter, R-2R Ladder, examples of D to A converters IC̣s, Analog to Digital converters: successive approximation, A/D converter, dual slope A/D Converter, Example of A/DConverterICs.	10	5
6	**Semiconductor Memories And Programmable Logic Devices**:Classification and characteristics of memories, Content addressable memory (CAM), commonly used memory chips, Introduction of PLD,ROM as a PLD, Programmable logic array, Programmable array logic, Complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA)	15	7
Total		**45**	**100**

Reference Books

1. **Modern Digital Electronics (TextBook)**
By R. P. Jain | Tata McGraw-Hill Education

2.	**Digital Logic and Computer Design** By Morris Mano | PHI
3.	**Fundamentals of Digital Circuits** By Anand Kumar | Prentice-Hall of India Private Limited, New Delhi (2006)

303105221 - Digital Electronics Laboratory

Course	Bachelor of Technology (BTech)	**Semester - 3**
Type of Course	-	
Prerequisite	Basic Electronics.	
Course Objective	This course is design to provide basic ideas of computer architecture. This course also makes help to understand organization and architecture of computer. It will help to develop their logical abilities	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks	Internal Marks	External Marks	Internal Marks	Total Marks
0	0	2	1.00	-	-	30	20	50

***SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

List of Practical

1.	**To Study and Testing of various Logic Gates ICs.** To Study and Testing of various Logic Gates ICs.
2.	**Configuring NAND and NOR logic gates as universal gates.** Configuring NAND and NOR logic gates as universal gates.
3.	**Design Logic Gates using TTL Logic Gamily.** Design Logic Gates using TTL Logic Gamily.
4.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Adder/ Subtractor, Code Converters,using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Adder/ Subtractor, Code Converters, using Logic Gates.
5.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Multiplexers/De-Multiplexres using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Multiplexers/De-Multiplexres using Logic Gates.
6.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Encoders/ Decoders, using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Encoders/ Decoders, using Logic Gates.
7.	**Study and configure of flip-flop using digital ICs. Design digital system using these circuits.** Study and configure of flip-flop using digital ICs. Design digital system using these circuits.
8.	**Study and configure of registers and counters using digital ICs. Design digital system using these circuits.** Study and configure of registers and counters using digital ICs. Design digital system using these circuits.
9.	**Study and Design A to D / D to A converters.** Study and Design A to D / D to A converters.
10.	**Introduction to FPGA / CPLD. Implementation of digital circuits studied in previous sessions using PLD/ CPLD / FPGA** Introduction to FPGA / CPLD. Implementation of digital circuits studied in previous sessions using PLD/ CPLD / FPGA

303105201 - DDS - DESIGN OF DATA STRUCTURES

SR.NO.	LECTURE NO	UNIT NO	TOPIC
			UNIT- 1 , INTRODUCTION :
1	1	1	Data Structures, Classifications (Primitive & Non-Primitive), Data structure Operations
2	2	1	Review of Arrays, Structures,
3	3	1	Self-Referential Structures, and Unions
4	4	1	Pointers and Dynamic Memory Allocation Functions.
5	5	1	Representation of Linear Arrays in Memory, dynamically allocated arrays
6	6	1	Performance analysis of an algorithm and space and time complexities
			UNIT-2 , Stacks, Recursion and Queue
7	7	2	Stacks: Definition, Stack Operations, Array Representation of Stacks
8	8	2	Stacks using Dynamic Arrays
9	9	2	Stack Applications: Polish notation, Infix to postfix conversion with examples ,
10	10	2	evaluation of postfix expression , Recursion -Factorial, GCD, Fibonacci Sequence, Tower of Hanoi
11	11	2	Queues: Definition, Array Representation, Simple Queue (Linear Queue), Queue Operations
12	12	2	Circular Queues, Circular queues using Dynamic arrays
13	13	2	Deque, Priority Queues and its problems
14	14	2	Applications of queue
			UNIT-3 , Linked Lists:
15	15	3	Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection
16	16	3	Linked list operations::Traversing, Searching, Insertion, and Deletion.
17	17	3	Doubly Linked lists
18	18	3	Circular linked lists, and header linked lists
19	19	3	Linked Stacks and Queues. Applications of Linked lists
			UNIT-4:Searching and Sorting:
20	20	4	Interpolation Search, Sorts: Selection Sort
21	21	4	Insertion Sort
22	22	4	Bubble Sort
23	23	4	Quick Sort,
24	24	4	Merge Sort, Radix Sort
			UNIT-5, Trees:
25	25	5	Terminology, Binary Trees, Properties of Binary trees
26	26	5	Array and linked Representation of Binary Trees,
27	27	5	Binary Tree Traversals - In Order, Post Order, Pre Order
28	28	5	Binary Tree Traversals - In Order, Post Order, Pre Order(CONTD.),Additional Binary tree operations
29	29	5	Threaded binary trees,
30	30	5	Binary Search Trees – Definition, Insertion, Deletion,
31	31	5	Binary Search Trees – Traversal, Searching
32	32	5	Numericals on Binary Search Tree
33	33	5	Application of Trees-Evaluation of Expression
			UNIT-6, Red Black Trees and AVL Trees
34	34	6	Introduction-Operations on Red Black Trees
35	35	6	AVL tree Construction
36	36	6	Operations on AVL Trees
			UNIT-7 , Hashing:
37	37	7	Hash Table organizations
38	38	7	Hashing Functions
39	39	7	Static and Dynamic Hashing
40	40	7	Static and Dynamic Hashing (CONTD.)
			UNIT-8 , Graphs:
41	41	8	Definitions, Terminologies
42	42	8	Matrix and Adjacency List Representation of Graphs
43	43	8	Elementary Graph operations
44	44	8	Traversal methods: Breadth First Search
45	45	8	Traversal methods: Depth First Search

303105202- DDS LAB - DESIGN OF DATA STRUCTURES LABORATORY

SR.NO.	LAB NO	PRACTICAL NO	PRACTICAL TITLE
1	1	1	Implement Stack and its operations like (creation push pop traverse peek search) using linear data structure
2	2		
3	3	2	Implement Infix to Postfix Expression Conversion using Stack
4	4		
5	5		
6	6	3	Implement Postfix evaluation using Stack
7	7	4	Implement Towers of Hanoi using Stack.
8	8	5	Implement queue and its operations like enqueue, dequeue, traverse, search.
9	9		
10	10	6	Implement Single Linked lists and its operations(creation insertion deletion traversal search reverse)
11	11		
12	12	7	Implement Double Linked lists and its operations(creation insertion deletion traversal search reverse)
13	13		
14	14	8	Implement binary search and interpolation search.
15	15		
16	16	9	Implement Bubble sort, selection sort, Insertion sort, quick sort ,merge sort.
17	17		
18	18		
19	19		
20	20		
21	21	10	Implement Binary search Tree and its operations (creation, insertion, deletion).
22	22		
23	23		
24	24	11	Implement Traversals Preorder Inorder Postorder on BST.
25	25		
26	26	12	Implement Graphs and represent using adjaceny list and adjacency matrix and implement basic operations with traversals (BFS and DFS)
27	27		

303105203 - DBMS – DATABASE MANAGEMENT SYSTEM -

SR NO..	LECTURE NO.	UNIT	TOPIC
1	1	1	Introduction and applications of DBMS , File Processing System and its limitations
2	2		ANSI/SPARC Model, Client-Server Architecture
3	3		Users & DBA, Database Architecture , Data Independence
4	4	2	Data Definition Language (DDL) commands, Data Manipulation Language (DML) commands
5	5		Data Control Language (DCL) commands, Transaction Control Language (TCL) commands.
6	6		Predicates & Clauses: Logical Operators (AND / OR), Relational Operators, BETWEEN Predicate, IN & NOT IN Predicate, LIKE Predicate.
7	7		Aggregate Functions, Character Functions
8	8		Arithmetic Functions, Date Functions, Conversion Functions.
9	9	3	Hierarchical Model, Network Model, Relational Model, Object Oriented Model.
10	10		Introduction to E-R Diagram, Entities, Attributes & its types, Relationships,
11	11		Mapping Cardinalities, Participation Constraints, Weak Entity Sets,
12	12		Specialization, Generalization, Aggregation
13	13	4	Introduction, Degree, Cardinality.
14	14		Primary Key, Foreign Key, Super Key, Candidate Key, Not Null Constraint, Check Constraint.
15	15		Selection, Projection, Cross-Product, Rename, Joins (Natural & Outer Join),
16	16		Set Operators (Union, Intersection, Set Difference), Aggregate Functions.
17	17	5	Functional Dependency – definition, trivial and non-trivial FD
18	18		Armstrong's Axioms/Inference Rules, Closure of FD, Closure of Attributes,
19	19		Candidate Key, Finding a Candidate Key, Decomposition (Lossy & Lossless), Database Anomalies,
20	20		Normalization – 1NF ,2 NF and 3 NF
21	21		Normalization – BCNF, 4NF, 5NF
22	22	6	Introduction, ACID Properties, Transaction Life Cycle
23	23		Scheduling, Serial Schedule, Interleaved Schedule,
24	24		Transaction Operations, Serializability (View & Conflict),
25	25		Two-Phase Commit Protocol.
26	26		Introduction, Log Based Recovery, Shadow Paging, Checkpoints
27	27		Introduction, Lock Based Protocol, Two Phase Lock Protocol
28	28		Intention Locking, Multiple Granularity, Time-based Protocol.
29	29		Introduction, Deadlock Detection, Deadlock Recovery
30	30		Deadlock Prevention (Wait-Die, Wound-Wait & Timeout-Based Approach).
31	31	7	Introduction, Layers of Query Processing
32	32		Measures of Query Cost, File Scans (Linear & Binary Search), Materialized View, Pipelining.
33	33		Introduction, Equivalence Rules, Cost-Based Query Optimization
34	34	8	Data Security, Data Integrity, Authentication, Authorization
35	35		Encryption, Decryption, Access Control (DAC, RBAC, MAC),
36	36		Intrusion Detection, SQL Injection
37	37	9	Views, PL/SQL Block
38	38		Cursors
39	39		Triggers
40	40		Stored Procedures, Store Functions

DATABASE MANAGEMENT SYSTEM LABORATORY - 303105204

SR.NO.	LAB NO	PRACTICAL TITLE
1	1	1. What is DBMS? Explain advantages of DBMS over FPS.
2	2	2. List 15 applications of Database. Explain any 2 how Database can be helpful in managing that application?
3	3	3. Create the Database
4	4	Create following Tables
5	5	Simple Queries:
6	6	Simple Queries
7	7	“Like” Queries
8	8	“Aggregate Functions & DML” Queries
9	9	“Join” Queries
10	10	“Join” Queries
11	11	“Miscellaneous” Queries
12	12	PL/SQL Block

303105205 - OBJECT ORIENTED PROGRAMMING WITH JAVA

SR NO.	LECTURE NO.	UNIT	TOPIC
1	1	1	1. Introduction to Object-Oriented Programming and Java Basics
2	2		2. Inheritance and Polymorphism in Java
3	3		3. Importance of Java and its Usage in Industry
4	4		4. Bytecode, Compiling, and Running Java Programs
5	5	2	Understanding Data Types and Variables
6	6		Scope and Lifetime of Variables
7	7		Type Conversion and Casting
8	8		Operators in Java
9	9	3	1. Introduction to Control Statements
10	10		2. Conditional Statements in Java
11	11		3. Looping Statements in Java
12	12		4. Advanced Looping Techniques and Nested Statements
13	13		5. Jump Statements and Their Usage in Java
14	14	4	Introduction to Arrays
15	15		Understanding Array Values and Memory Storage Structure
16	16		Types of Arrays: One-Dimensional and Multi-Dimensional Arrays
17	17		Advanced Array Operations and Applications
18	18	5	Introduction to Classes and Objects
19	19		Declaring Objects and Assigning Object Reference Variables
20	20		Methods in Java Classes
21	21		Constructors in Java Classes
22	22		Access Control in Java Classes
23	23		Garbage Collection and Memory Management
24	24		Usage of Static with Data and Methods
25	25		Usage of Final with Data and Methods
26	26	6	Inheritance Basics and Member Access Rules
27	27		Method Overriding, Abstract Classes, Dynamic Method Dispatch, and Using 'final' with Inheritance
28	28	7	String Handling Functions in Java
29	29		Packages, Class Path, and Importing Packages
30	30		Understanding Differences between Classes and Interfaces
31	31		Implementing and Applying Interfaces in Java
32	32		Enumerations in Java: Introduction and Usage
33	33	8	1. Introduction to Exceptions and Types
34	34		2. Handling Strategies for Exceptions
35	35		3. Advanced Exception Handling Techniques
36	36	9	Introduction to Threads
37	37		Usage of Threads
38	38		Types of Threads
39	39		Handling Threads
40	40	10	Introduction to Collections Framework
41	41		Understanding Functional Programming in Java
42	42		Overview of Collection Interfaces
43	43		Introduction to Collection Classes
44	44		Hierarchy of Collection Interfaces
44	44		Hierarchy of Collection Classes
44	44		Functional Programming Features in Collections Framework
44	44		Applying Functional Programming Techniques in Collections

303105206 - OOPJ - OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY-

SR.NO.	LAB NO	PRACTICAL TITLE
1	1	write a program to display Hello World message in console window.
2	2	Write a program to perform arithmetic and bitwise operations in a single source program without object creation.
3	3	Write a program to perform arithmetic and bitwise operations by creating individual methods and classes than create an object to execute the individual methods of each operation.
4	4	Write a java program to display the employee details using Scanner class.
5	5	Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions?
6	6	The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non- recursive functions to print the nth value of the Fibonacci sequence?
7	7	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?
8	8	Write a Java program to multiply two given matrices?
9	9	Write a Java program for sorting a given list of names in ascending order?
10	10	Write a java program for Method overloading and Constructor overloading
11	11	Write a java program to represent Abstract class with example.
12	12	Write a program to implement multiple Inheritances.
13	13	write program to demonstrate method overriding and super keyword.
14	14	Write a java program to implement Interface using extends keyword.
15	15	Write a java program to create inner classes.
16	16	Write a java program to create user defined package.
17	17	Write a Java program that displays the number of characters, lines and words in a text?
18	18	Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?
19	19	Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (Use StringTokenizer class)?
20	20	Write a java program for creating single try block with multiple catch blocks.
21	21	write a program for multiple try blocks and multiple catch blocks including finally.
22	22	write a program to create user defined exception.
23	23	Write a java program for producer and consumer problem using Threads.
24	24	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
25	25	write a program to create dynamic array using ArrayList class and the print the contents of the array object.
26	26	Write programs to implement add, search and remove operation on ArrayList object.

303191202 – DM - DISCRETE MATHEMATICS

SR NO.	LECTURE NO.	UNIT	TOPIC
1	1	1	**Sets, Relation, and Function**
2	2		Cartesian products, Binary relation, Partial ordering relation, Equivalence relation
3	3		Size of a set, Finite and infinite sets, Countable and uncountable Sets
4	4		Cantor's diagonal argument, The power Set theorem, Schroeder-Bernstein theorem
5	5		**Lattices:** Definitions and properties, Hasse diagrams, and Examples
6	6		Tutorial-1
7	7	2	**Propositional Logic and Proof Techniques**
8	8		Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth
9	9		Tables.
10	10		Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.
11	11		**Proof Techniques:** Some terminology, Proof methods and Strategies, Forward Proof,
12	12		Proof by contradiction, Proof by contraposition, Proof of necessity and sufficiency.
13	13		Tutorial-2
14	14	3	**Principles of Mathematical Induction**
15	15		The Well-Ordering Principle, Recursive definition, The division algorithm: Prime Numbers.
16	16		The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.
17	17		Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.
18	18		Tutorial-3
19	19	4	**Graphs and Trees**
20	20		Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph
21	21		Isomorphism, Eulerian and Hamiltonian Walks
22	22		Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring,
23	23		Perfect Graph, definition properties and Example
24	24		Rooted trees, trees and sorting, weighted trees and prefix codes
25	25		Bi-connected component and Articulation Points, Shortest distances.
26	26		Tutorial-4
27	27	5	**Algebraic Structures and Morphism**
28	28		Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups
29	29		Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups,
30	30		Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings,
31	31		Integral Domain and Fields
32	32		Boolean Algebra and Boolean Ring, Identities of Boolean Algebra
33	33		
34	34		Duality, Representation of Boolean Function,
35	35		Disjunctive and Conjunctive Normal Form
36	36		Tutotial-5

PROFESSIONAL COMMUNICATION SKILLS-1 (203193201)

Sr No.	Lecture No.	Unit No.	Topics
1	1	1	Reading Comprehension
2	2		Interpersonal Communication at Workplace: Introduction
3	3	2	Interpersonal Communication at Workplace:
4	4		Interpersonal Communication at Workplace: Non-
5	5	3	The Art of Negotiation
6	6		Picture Perception Tutorial Activity:
7	7	4	Goal setting & Tracking
8	8		Time Management & Task Planning (Case study) Tutorial
9	9	5	Debate: The three minute debate planner
10	10		Debate
11	11	6	Debate
12	12		Technical Writing: Email etiquette & Email writing
13	13	7	Letter Writing: Business letter writing etiquette
14	14		Technical Writing: Types of letters & Layout
15	15	8	Technical Writing: Appreciation letter
16	16		Technical Writing: Apology and Acknowledgement letters
17	17	9	Listening Skills: Small everyday conversation & comprehension
18	18		Advanced vocabulary Building:
19	19	10	Advanced vocabulary Building:
20	20		Advanced vocabulary Building:
21	21	11	Advanced vocabulary Building:
22	22		Information design and writing for print and online media: Blog Writing
23	23	12	Information design and writing for print and online media: Blog Writing
24	24		Reading Comprehension

303105220 - Digital Electronics

Sr No.	Lecture no.	Unit	Topic
1	1	1	Introduction to Digital Systems and Binary Numbers
2	2	1	Number Systems and Conversions
3	3	1	Binary Arithmetic
4	4	1	Logic Gates and Boolean Algebra
5	5	1	Standard Forms of Boolean Expressions
6	6	1	Simplification of Boolean Functions
7	7	1	Karnaugh Maps
8	8	1	Quine-McCluskey Method
9	9	1	Overview of Digital ICs and Logic Families
10	10	2	Introduction to Combinational Circuits
11	11	2	Designing Combinational Circuits
12	12	2	Adders and Subtractors
13	13	2	Multiplexers and Demultiplexers
14	14	2	Encoders and Decoders
15	15	2	Code Converters
16	16	2	Parity Generators and Checkers
17	17	2	BCD Arithmetic Circuits
18	18	2	Introduction to PLDs (Programmable Logic Devices)
19	19	3	Introduction to Sequential Circuits
20	20	3	Latches and Flip-Flops
21	21	3	Types of Flip-Flops
22	22	3	Flip-Flop Conversions
23	23	3	Counters: Asynchronous and Synchronous
24	24	3	Designing Counters
25	25	3	Shift Registers
26	26	3	Applications of Shift Registers
27	27	3	State Machines and State Diagrams
28	28	4	Introduction to Memory Devices
29	29	4	Types of Memory: RAM, ROM, EEPROM, etc.
30	30	4	Memory Organization and Operation
31	31	4	Designing Memory Systems
32	32	4	Introduction to Programmable Logic Devices (PLDs)
33	33	4	Complex Programmable Logic Devices (CPLDs)
34	34	4	Field Programmable Gate Arrays (FPGAs)
35	35	4	Designing with FPGAs
36	36	4	Applications of PLDs and FPGAs
37	37	5	Introduction to Digital System Design
38	38	5	Design Methodologies and Practices
39	39	5	Designing Arithmetic Circuits
40	40	5	Designing Control Circuits
41	41	5	Designing Interface Circuits
42	42	5	Digital Signal Processing Basics
43	43	5	Applications in Communication Systems
44	44	5	Applications in Embedded Systems
45	45	5	Future Trends in Digital Electronics

303105221 - Digital Electronics Laboratory

Sr No.	Lab no.	Topic
1	1	To Study and Testing of various Logic Gates ICs.
2	2	Configuring NAND and NOR logic gates as universal gates
3	3	Design Logic Gates using TTL Logic Gamily
4	4	Study and Implementation of Boolean Logic Functions and combinational circuits like Adder/ Subtractor, Code Converters,using Logic Gates
5	5	Study and Implementation of Boolean Logic Functions and combinational circuits like Multiplexers/De-Multiplexres using Logic Gates
6	6	Study and Implementation of Boolean Logic Functions and combinational circuits like Encoders/ Decoders, using Logic Gates
7	7	Study and configure of flip-flop using digital ICs. Design digital system using these circuits
8	8	Study and configure of registers and counters using digital ICs. Design digital system using these circuits.
9	9	Study and Design A to D / D to A converters.
10	10	Introduction to FPGA / CPLD. Implementation of digital circuits studied in previous sessions using PLD/ CPLD / FPGA