DATA STRUCTURES AND ITS APPLICATIONS USING C

Sub Code :	**21SCS32**	**IA Marks :**	**50**
Hrs./ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**40**

Course Objectives:

- Explain the fundamentals of data structures and their applications essential for programming/ problem solving.
- Analyze linear data structures: stacks queues and lists.
- Analyze non linear data structures: trees and graphs.
- Analyze and evaluate the sorting and searching algorithms.
- Access appropriate data structures during the program development/ problem solving.

Course Outcomes:

On Completion of this course, students able to,
CO1: Use different types of data structures, operations and algorithms and apply searching and sorting operations on files.
CO2: Use stack, Queue in problem solving.
CO3: Use Lists in problem solving.
CO4: Use Trees in problem solving.
CO5: Use Graphs in problem solving.

MODULE I

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.

Array Operations: Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices.

Strings: Basic Terminology, Storing, Operations, Programming Examples.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

08 Hours

MODULE II

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, Ackerman\'s function.

Queues: Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues. Programming Examples.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

08 Hours

MODULE III

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 – Polynomials, Sparse matrix representation. Programming Examples.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

08 Hours

MODULE IV

Trees: Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, Programming Examples.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

08 Hours

MODULE V

Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations.

Traversal methods: Breadth First Search and Depth First Search.

Sorting and Searching: Insertion Sort, Radix sort, Address Calculation Sort. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

Files and Their Organization: Data Hierarchy, File attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

08 Hours

Continuous Internal Assessment (CIA) Method:

Sl. No.	Type of Assessment	Mode of Assessment	Marks
1	Solving Challenging Problems/Case Study	Regular mode of Assessment	15
2	One Open Book written Exam at theend of the Module 4	Regular mode of Assessment	10
3	Assignments on Advanced Topics(group of size 2)/individual)	Regular mode of Assessment	10
4	MCQ at the end of each module	2 marks for eachModule	10
5	Attendance	As per the guidelines given in the regulations	5
Total			**50**

Scheme of Examination for End Semester Examination of 50 Marks:
PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.
1 Marks x 10 = **10 Marks**
PART B: TWO question to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

TEXT BOOKS:

1. Fundamentals of Data Structures in C - Ellis Horowitz and SartajSahni, 2nd edition,Universities Press,2014.
2. Data Structures - Seymour Lipschutz, Schaum's Outlines, Revised 1st edition, McGraw Hill,2014.

REFERENCE BOOKS:
1. Data Structures: A Pseudo-code approach with C –Gilberg&Forouzan, 2nd edition,Cengage Learning, 2014.
2. Data Structures using C, ReemaThareja, 3rd edition Oxford press, 2012.
3. An Introduction to Data Structures with Applications- Jean-Paul Tremblay & Paul G.Sorenson, 2nd Edition, McGraw Hill, 2013.

COMPUTER ARCHITECTURE AND DESIGN

Sub Code :	**21SCS33**	**IA Marks :**	**50**
Hrs./ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**50**

Course Objectives:

After studying this course, students will be able to:

- Describe, Illustrate and Analyze Combinational Logic circuits, Simplification of Algebraic Equations using Karnaugh Maps and QuineMcClusky Techniques.
- Describe and Design Decoders, Encoders, Digital multiplexers, Adders and Subtractors, Binary comparators, Latches and Master-Slave Flip-Flops.
- Explain and design Registers and Counters.
- Illustrate the concept of programs as a sequences of machine instructions.
- Illustrate organization of a simple processor, piplined processors and other computing systems.

Course Outcomes:

CO1: Simplify digital circuits using Karnaugh Map , POS and Quine-McClusky Methods
CO2: Explain Gates and flipflops and make us in designing different data processing circuits, registers and counters and compare the types.
CO3: Develop simple HDL
CO4: Explain the basic of Computer Structure, memory, addresses and machine instructions.
CO5: Illustrate and Analyze simple arithmetic, basic processing unit and pipelining.

Module I

The Basic Gates: Review of Basic Logic gates, Positive and Negative Logic, Introduction to HDL.
Combinational Logic Circuits: Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplification, Don't-care Conditions, Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McClusky Method, HDL Implementation Models.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concepts* **10 Hours**

Module II

Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD to Decimal Decoders, Encoders, Exclusive-OR Gates, Programmable Logic Devices, HDL Implementation of Data Processing Circuits.
Flip- Flops: RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS FLIP-FLOP, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIP-FLOPs. FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, Switch

Contact Bounce Circuits, HDL Implementation

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*

10 Hours

Module III

Registers: Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In - Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers, Register implementation in HDL.

Counters: Asynchronous Counters, Decoding Gates, Synchronous Counters, Decade Counters, Counter Design as a Synthesis, A Digital Clock, Counter Design using HDL.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*.

10 Hours

Module IV

Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance -Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations, Additional Instructions, Encoding of Machine Instructions.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept* .

10 Hours

Module V

Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Integer Division.

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control.

Pipelining: Basic concepts of pipelining.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept* .

10 Hours

Continuous Internal Assessment (CIA) Method:

Sl. No.	Type of Assessment	Mode of Assessment	Marks
1	Solving Challenging Problems/Case Study	Regular mode of Assessment	15
2	One Open Book written Exam at theend of the Module 4	Regular mode of Assessment	10
3	Assignments on Advanced Topics(group of size 2)/individual)	Regular mode of Assessment	10
4	MCQ at the end of each module	2 marks for each Module	10
5	Attendance	As per the guidelines given in the regulations	5
Total			**50**

Scheme of Examination for End Semester Examination of 50 Marks:
PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.
1 Marks x 10 = **10 Marks**
PART B: TWO question to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015
2. Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

Reference Books:

1. M Morris Mano: Digital Logic and Computer Design, 10th Edition, Pearson, 2008.
2. A.K Maini,Varsha Agarval, Electronic Devices And Circuit,1st Edition, 2011.
3. Willian Stallings: Computer Organization & Architecture, 9th edition, Pearson, 2015.

OBJECT ORIENTED PROGRAMMING USING JAVA

Sub Code	**:**	**21SCS34**	**IA Marks**	**:**	**50**
Hrs./ Week	**:**	**3**	**Exam Hours**	**:**	**2**
Credits	**:**	**3**	**Exam Marks:**		**50**
Mode of Delivery	**:**	**RM**	**Total Hours**	**:**	**40**

Course Objectives:

- Describe and Analyze the fundamental features of object oriented language and JAVA.
- Develop Java JDK environment to create, debug and run simple Java programs.
- Explain object oriented concepts using programming examples.
- Illustrate the concepts of importing of packages and exception handling mechanism.
- Discuss the String Handling examples with Object Oriented concepts.

Course Outcomes:

On Completion of this Course students are able to,

CO1: Explain the object-oriented concepts and JAVA.

CO2: Develop computer programs to solve real world problems in Java.

CO3: Develop simple GUI interfaces for a computer program to interact with users and to understand the event-based GUI handling principles using Applets and swings.

CO4: Create multi-threaded programs and event handling mechanisms.

CO5: Develop simple GUI Using applets concepts.

MODULE I

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Arrays, A Few Words About Strings.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE II

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE III

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance and with Object Class.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE IV

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE V

Enumerations, Type Wrappers, I/O, Applets, and Other Topics: I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, Applet Fundamentals, The transient and volatile Modifiers, Using instance of, strictfp, Native Methods, Using assert, Static Import, Invoking Overloaded Constructors Through this( ), String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String , Additional String Methods, String Buffer, String Builder.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

Continuous Internal Assessment (CIA) Method:

Sl. No.	Type of Assessment	Mode of Assessment	Marks
1	Solving Challenging Problems/Case Study	Regular mode of Assessment	15
2	One Open Book written Exam at theend of the Module 4	Regular mode of Assessment	10
3	Assignments on Advanced Topics(group of size 2)/individual)	Regular mode of Assessment	10
4	MCQ at the end of each module	2 marks for each Module	10
5	Attendance	As per the guidelines given in the regulations	5
Total			**50**

Scheme of Examination for End Semester Examination of 50 Marks:
PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.
1 Marks x 10 = **10 Marks**
PART B: TWO question to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

TEXT BOOKS:

1. JAVA, The Complete Reference, Herbert Schildt, 7th Edition, Tata McGraw Hill, 2007.

REFERENCE BOOKS:

1. Programming with JAVA, Mahesh Bhave and Sunil Patekar, First Edition, Pearson Education 2008.
2. Object oriented Programming with JAVA, Rajkumar Buyya,S Thamarasi selvi, xingchen chu, Tata McGraw Hill education private limited, 2010.
3. JAVA One step Ahead, Anita Seth and B L Juneja, Oxford University Press, 2017.

INTRODUCTION TO BIO-INFORMATICS

Sub Code :	**21SCS35**	**IA Marks :**	**50**
Hrs./ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery :	**RM**	**Total Hours :**	**40**

Course Objectives:

- Impart knowledge on basic techniques of Bioinformatics and on analysis of biological data using computational methods
- Investigating the problems in molecular and biology from the computational perspectives.

Course Outcomes:

On Completion of this Coues Students are able to,

CO1: Extract information from different types of bioinformatics data (gene, protein, disease, etc.), including their biological characteristics and relationships.
CO2: Employ different data representation models and formats used for bioinformatics data representation, including markup languages such as SBML and CellML, and ontologies such as GO ontology.
CO3: Apply the different approaches used for data integration and data management, including data warehouse and wrapper approaches.
CO4: Design and develop bioinformatics solutions by adapting existing tools, designing new ones or a combination of both.

MODULE I

Introduction: Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary 40 & reference systems, finding new type of data online. Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, overview of the bioinformatics applications.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE II

DNA: Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA, DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and

function, Nucleic acid-Protein interaction.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE III

Applications for bioinformatics: Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, mounting/ unmounting files, tar, gzip / gunzip, telnet, ftp, developing applications on Linux OS, Understanding and Using Biological Databases, Overview of Java, CORBA, XML, Web deployment concepts.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE IV

Biological data storage techniques: Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

MODULE V

Representation of patterns and relationships in bioinformatics: Macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: sequence alignment algorithms, regular expressions, hierarchies and graphical models, Phylogenetic BLAST.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept .*

08 Hours

Continuous Internal Assessment (CIA) Method:

Sl. No.	Type of Assessment	Mode of Assessment	Marks
1	Solving Challenging Problems/Case Study	Regular mode of Assessment	15
2	One Open Book written Exam at theend of the Module 4	Regular mode of Assessment	10
3	Assignments on Advanced Topics(group of size 2)/individual)	Regular mode of Assessment	10
4	MCQ at the end of each module	2 marks for each Module	10
5	Attendance	As per the guidelines given in the regulations	5
Total			**50**

Scheme of Examination for End Semester Examination of 50 Marks:
PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.
1 Marks x 10 = **10 Marks**
PART B: TWO question to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

TEXT BOOKS:

1. Fundamental concepts of Bioinformatics – D E Krane and M L Raymer, Pearson Education.2014.
2. Bioinformatics Methods & applications, Genomics, Proteomics & Drug Discovery – Rastogi, Mendiratta and Rastogi, PHI, New Delhi, 2010.

REFERENCE BOOKS:

1. Bioinformatics: with fundamentals of genomics and proteomics – Shubha Gopal, et.al., Mc Graw Hill.2015.
2. Developing Bio informatics computer skills – O'Reilly, CBS.2014.
3. Evolutionary Bioinformatics – Forsdyke, Springer, 2014.

DATA STRUCTURES USING C LAB

Sub Code	**:**	**21SCSL36**	**IA Marks**	**:**	**50**
Hrs/ Week	**:**	**1T+2L**	**Exam Hours**	**:**	**3**
Credits	**:**	**2**	**Exam Marks:**		**50**
Mode of Delivery	**:**	**RM**	**Total Hours**	**:**	**42**

Course Objectives:

This laboratory course enable students to get practical experience in design, develop and implement,

- Analyze and evaluation/testing of Asymptotic performance of algorithms.
- Linear data structures and their applications such as Stacks, Queues and Lists.
- Non-Linear Data Structures and their Applications such as Trees and Graphs.
- Sorting and Searching Algorithms.

Course outcomes:

On Completion of this course the students are able to,

CO1: Analyze and Compare various linear and non-linear data structures.
CO2: Code, debug and demonstrate the working nature of different types of data structures and their applications.
CO3: Implement, analyze and evaluate the searching and sorting algorithms.
CO4: Choose the appropriate data structure for solving real world problems.

Laboratory Experiments:

1. Design, Develop and Implement a menu driven Program in C for the following Array operations

a. Creating an Array of N Integer Elements

b. Display of Array Elements with Suitable Headings

c. Inserting an Element (ELEM) at a given valid Position (POS)

d. Deleting an Element at a given valid Position(POS)

e. Exit.

Support the program with functions for each of the above operations

2. Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX)

a. Push an Element on to Stack

b. Pop an Element from Stack

c. Demonstrate Overflow and Underflow situations on Stack

d. Display the status of Stack

e. Exit

Support the program with appropriate functions for each of the above Operations

3. Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *,/, %(Remainder), ^(Power) and alphanumeric operands.

4. Design, Develop and Implement a Program in C for the following Stack Applications

a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^

b. Solving Tower of Hanoi problem with n disks

5. Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX)

a. Insert an Element on to Circular QUEUE

b. Delete an Element from Circular QUEUE

c. Demonstrate Overflow and Underflow situations on Circular QUEUE

d. Display the status of Circular QUEUE

e. Exit Support the program with appropriate functions for each of the above Operations

6. Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: USN, Name, Branch, Sem, PhNo

a. Create a SLL of N Students Data by using front insertion.

b. Display the status of SLL and count the number of nodes in it

c. Perform Insertion and Deletion at End of SLL

d. Perform Insertion and Deletion at Front of SLL

e. Exit

7. Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: SSN, Name, Dept, Designation, Sal, PhNo

a. Create a DLL of N Employees Data by using end insertion.

b.Display the status of DLL and count the number of nodes in it

c. Perform Insertion and Deletion at End of DLL

d. Perform Insertion and Deletion at Front of DLL

e. Demonstrate how this DLL can be used as Double Ended Queue

f. Exit

8. Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers

a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2

b. Traverse the BST in In-order, Pre-order and Post Order

c. Search the BST for a given element (KEY) and report the appropriate message

d. Exit

9. Design, Develop and Implement a Program in C for the following operations on Graph(G) of Cities

a. Create a Graph of N cities using Adjacency Matrix.

b. Print all the nodes reachable from a given starting node in a digraph using BFS method

c. Check whether a given graph is connected or not using DFS method

10. Given a File of N employee records with a set K of Keys(4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table(HT) of m memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Design and develop a Program in C that uses Hash function H: K $\rightarrow$L as H(K)=K mod m (remainder method),and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.

Continuous Internal Assessment (CIA) Method:

Sl. No	Type of Assessment	Mode of Assessment	Marks
1	Mini –Project / Solving Challenging Problems	Regular mode of Assessment	10
2	Assessment in each Lab session for 2 marks (10 Lab Sessions)	Regular mode of Assessment using rubrics	20
3	Maintaining the Record Note Book	Regular mode of Assessment	05
4	Viva at the end of each lab session	2 marks for each Module	10
5	Attendance	As per guidelines given in the regulations	05
		Total	**50**

Conduction of Practical Examination:

1. All laboratory experiments (TEN nos) are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script
4. Marks distribution: Procedure + Conduction + Viva:12 + 28 +10 = 50

Change of experiment is allowed only once and marks allotted to the procedure part to be made zero

OOPS USING JAVA LAB

Sub Code :	**21SCSL37**	**IA Marks :**	**50**
Hrs/ Week :	**1T+2L**	**Exam Hours :**	**3**
Credits :	**2**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**42**

Course Objectives:

- Design and implement various algorithms in JAVA.
- Employ various design strategies for problem solving constructs.

Course outcomes:

On completion of this course the students able to,

CO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering Specialization to the solution of complex engineering problems.

CO2: Understand the impact of the professional engineering solutions in societal and environmental Contexts, and demonstrate the knowledge of, and need for sustainable development.

LABORATORY EXPERIMENTS:

1. Write a Java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

2 a. Write a Java program that works as a simple calculator.

b. Write a Java program to sort for an element in a given list of elements using bubble sort.

3. Create a Java class called Student with the following details as variables within it.

(i) USN
(ii) Name
(iii) Branch
(iv) Phone

Write a Java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.

4 a. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.

b. Write a java program for abstract class to find areas of different shapes.

5. Design a superclass called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.

6. Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as "/".

7. Write a Java program that implements a multi-thread application that has three threads. First thread

generates a random integer for every 1 second; second thread computes the square of the number andprints; third thread will print the value of cube of the number.

8. Write a java program that displays the number of characters, lines and words in a text file.

9. Write a java program that reads a file and displays the file on the screen with line number b.

10. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

Continuous Internal Assessment (CIA) Method:

Sl. No	Type of Assessment	Mode of Assessment	Marks
1	Mini –Project / Solving Challenging Problems	Regular mode of Assessment	10
2	Assessment in each Lab session for 2 marks (10 Lab Sessions)	Regular mode of Assessment using rubrics	20
3	Maintaining the Record Note Book	Regular mode of Assessment	05
4	Viva at the end of each lab session	2 marks for each Module	10
5	Attendance	As per guidelines given in the regulations	05
		Total	**50**

Conduction of Practical Examination:

1. All laboratory experiments (TEN nos) are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Strictly follow the instructions as printed on the cover page of answer script
4. Marks distribution: Procedure + Conduction + Viva:12 + 28 +10 = 50

Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.

EMPLOYABILITY SKILLS ENHANCEMENT PROGRAMME 1 (ESEP 1)

Sub Code :	**21SQA38**	**IA Marks :**	**50**
Hrs/ Week :	**2**	**SEE Marks :**	**-**
Credits :	**2**	**Total Hours :**	**25**

Course Objectives:

This course enables students to develop their ability to reason by introducing them to elements of formal reasoning. The primary focus will be on recognizing the logical structure of arguments. Topics will include types of statements, symbolism, logical connectives, logical relations, basic deductive inferences, truth tables, validity, invalidity, and soundness. To enhance the problem-solving skills, to improve the basic mathematical skills and to help students who are preparing for any type of competitive examinations with Domain specific training in respective branches.

Course Outcomes:

After studying this course, students will be able to:

- Understand the basic concepts of QUANTITATIVE ABILITY
- Understand the basic concepts of LOGICAL REASONING Skills
- Acquire satisfactory competency in use of VERBAL REASONING
- Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
- Learn domain specific knowledge
- Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

PART - A

Number system - "a. Number system b. Power cycle c. Remainder cycle d. Factors, Multiples e. HCF and LCM f. Trailing Zeroes", Data arrangements and Blood relations - "a. Linear Arrangement b. Circular Arrangement c. Multi-dimensional Arrangement d. Blood Relation e. Option elimination method in Blood Relation"

Time and work - "a. Work with different efficiencies b. Alternate day work c. Pipes and cisterns d. Work equivalence e. Division of wages f. Leaving the work concept with example

Coding & decoding, Number Series, Analogy, Odd man out - "a. Different types of Problems on Coding and Decoding b. Mixed Series,alternate Series, mixed operaional series c.Analogy d. Odd Man Out"

Reading comprehension - "a. Types and Tackling Strategies.b. Understanding meaning of a text.c. Drawing Connections.d. Summarizing and Synthesizing.e. Building Vocabulary.f. Speed Reading Strategies." Antonyms & Synonyms - "a. Understanding root words.b. Prefixes.c. Suffixes.d. Vocabulary building.e. Putting words into context. f. Word Power made easy. g. Elimination."

PART - B

C Programming
Data Structures & Algorithms C++
Computer Organization and Architecture HTML and XML
Computer fundamentals Computer Awareness DOS

Marks allotment pattern:

- 10 assessment tests will be conducted based on Multiple choice questions.
- Final marks are based on the test marks conducted during the semester.

Reference Books

1. Quantitative abilities by Arun Sharma
2. Quantitative Aptitude for Competitive Examinations by R S Agrawal
3. Verbal and Non-Verbal reasoning by R S Agrawal

INTERNATIONAL CERTIFICATION COURSE ON CURRENT TRENDS- 1

Sub Code :	**21SCS30**	**IA Marks :**	**-**
Self Study Hours/Week:	**2**	**SEE Marks :**	**-**
Credits :	**1**	**Total Hours :**	**-**

Course Objectives:

- Exposure to the latest development in the field
- Learn the new skills
- To make the students Industry ready
- To increase the confidence level of students
- To provide additional knowledge

Course Outcomes:

On completion of this course, students will be able to:

CO1: Have exposure on the latest development

CO2: Acquire new skills

CO3: Become Industry ready

CO4: Have more confidence

CO5: Get additional knowledge

About the Course:

- A common Certification Course on current trends will be offered to all the students of the batch.
- The course will be conducted on blended mode.
- At the end of the course, the student has to produce/submit the certificate issued by the certification agency after completing the assessment for the programme.

Assessment Method

- Assessment will be conducted for 2 Hours duration for 50 Marks on completion of the course and based on the marks scored, grading will be done.