**UTTARAKHAND BOARD OF TECHNICAL EDUCATION**

**JOINT ENTRANCE EXAMINATION AND TRAINING, RESEARCH DEVELOPMENT CELL, DEHRADUN**

**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME**

**BRANCH NAME– COMPUTER SCIENCE AND ENGINEERING** **SEMESTER – IV**

| Subject Code | Subject | L | T | P | TOT | EVALUATION SCHEME | | | | | | Total Marks | Credit Point |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Internal | | External | | | | | |
| | | Period/Weeks | | | | Theory | Practical | Theory | | Practical | | | |
| | | | | | | Max Marks | Max Marks | Max Marks | Hrs. | Max Marks | Hrs. | | |
| **054003** | Data Structure Using C | 4 | - | 5 | 9 | 30 | 30 | 70 | 2.5 | 60 | 3.0 | 190 | 5 |
| **054006** | Object Oriented Concepts | 4 | - | 5 | 9 | 30 | 30 | 70 | 2.5 | 60 | 3.0 | 190 | 5 |
| **054004** | Internet and Web Technology | 4 | - | 5 | 9 | 30 | 30 | 70 | 2.5 | 60 | 3.0 | 190 | 5 |
| **054005** | Relational Data Base Management System | 4 | - | 5 | 9 | 30 | 30 | 70 | 2.5 | 60 | 3.0 | 190 | 4 |
| **054002** | Computer System Organization and Architecture | 4 | - | - | 4 | 30 | - | 70 | 2.5 | - | - | 100 | 4 |
| **054001** | Computer Network and Security | 4 | - | - | 4 | 30 | - | 60 | 2.5 | - | - | 90 | 4 |
| **054052** | Industrial Exposure (Assessment at Inst. Level)+ | - | - | - | - | - | 25 | - | - | - | - | 25 | 2 |
| **014054** | General Proficiency # | - | - | 4 | 4 | - | 25 | - | - | - | - | 25 | 1 |
| **054053** | Industrial Training | Industrial training of 04weeks/30 days done after fourth sem would be evaluated in 5th semester through report and viva – voce | | | | | | | | | | | - |
| **Total** | | **24** | **-** | **24** | **48** | **180** | **170** | **410** | **-** | **240** | **-** | **1000** | **30** |

\# Student Centered Activities will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities etc.

\+ Industrial visit compulsory at minimum 2 Industries or Department.

**Note:** 1- Each period will be 50 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 12.5 weeks.

**Branch Code - 05**

# FOURTH SEMESTER

# COMPUTER SCIENCE AND ENGINEERING

# DATA STRUCTURES USING C

**Subject Code : 054003**

| L | T | P |
|---|---|---|
| 4 | - | 5 |

## RATIONALE

Data structures are the techniques of designing the basic algorithms for real-life projects. In the present era, it is very essential to develop programs and organize data in such a way that it solves a complex problem efficiently. Understanding of data structures is essential and this facilitates to acquire sound knowledge of the insight of hardware requirement to any problem base. The practice and assimilation of data structure techniques is essential for programming.

## OBJECTIVES

- Define Linear and non-linear data structures.
- List and discuss the different types of linear data structures.
- Differentiate Stack and Queue
- Understand the Operations of Stack
- Explain the applications of stack
- Explain Linked lists and its implementation
- Define a tree and the different terms related with trees.
- Describe the different ways of traversing a binary tree.
- Discuss the various operations on Binary Search tree.
- Define graph terminologies and describe the different ways of traversing a graph.
- Write the algorithm for different types of sorting.
- Write the algorithm for different types of searching.

## DETAILED CONTENTS

**1. Introduction to Data Structures : (6 Periods)**

Introduction - Data and Information - Elementary data structure organization - Types of data structures - Primitive and Non Primitive data structures – Operations on data structures : Traversing, Inserting, Deleting, Searching, Sorting, Merging - Different Approaches to designing an algorithm : Top-Down approach , Bottom-up approach - Complexity : Time complexity , Space complexity.

**2. Definition of a Stack:** **(6 Periods)**

Operations on Stack (PUSH & POP)- Implementing Push and Pop Operations- Implementation of stack through arrays–Applicationsof Stack : Reversing a list- Polish notations - Conversion of infix to postfix expression- Evaluation of postfix expression.

**3. Recursion - Recursive definition:** **(4 Periods)**

Properties of Recursive algorithms/functions – Advantages and Disadvantages of Recursion, Tower of Hanoi Problem.

**4. Queues:** **(6 Periods)**

The queue and its representation - implementation of Queues and their operations - implementation of Circular queues and their operations - Dequeue and Priority queues (Concepts only)

**5. Linked List:** **(10 Periods)**

Node, Address, Pointer, Information, Null Pointer, Empty list -.Type of lists : Singly linked list , Doubly linked list, Circular list - Representation of singly linked lists in Memory-Difference between Linked & sequential List – Advantages and Disadvantages of Linked list- Operations on a singly linked list (only algorithm) : Traversing a singly linked list, Searching a singly linked list, Inserting a new node in a singly linked list ( front, middle, end), Deleting a node from a singly linked list (front, middle, rear) - Doubly linked list, Circular linked lists (Concepts only, no implementations)

**6. Trees:** **(10 Periods)**

Terminologies: Degree of a node, degree of a tree, level of a node, leaf node, Depth / Height of a tree, In-degree & out-Degree, Path, Ancestor & descendant nodes-, siblings - Type of Trees : Binary tree - List representation of Tree - Binary tree traversal: In order traversal, Preorder traversal, Post order traversal, Binary Search Tree.

**7. Graphs :** **(8 Periods)**

Introduction - Terminologies: graph, node (Vertices), arcs (edge), directed graph, in-degree, out-degree, adjacent, successor, predecessor, relation, weight, path, length - Representations of a graph - Adjacency Matrix Representation - Adjacency List Representation - Traversal of graphs : Depth- first search (DFS), Breadth-first search (BFS) - Applications of Graph

**8. Sorting Techniques :** **(8 Periods)**

Introduction – Algorithms and "C" programs for : Selection sort, Insertion sort, Bubble sort – Algorithms only : Merge Sort, Radix sort, Shell sort, Quick sort.

**9. Searching :** **(4 Periods)**

Introduction - Algorithms and "C" programs for Linear search and Binary search

**TEXT BOOK**


1. Data Structures, Sey Mour Lipschutz Schaum;s outlines, TMH Private Limited, New Delhi, Indian Adapted Edition 2006. 20th Reprint 2011
2. Data Structures with C, Sey Mour Lipschutz, Schaum;s outlines, TMH Private First Reprint 2011
3. Data Structures A Programming approach with C, Dharmender Singh Kushwaha and Arun Kumar Misra, Prentice Hall of India, New Delhi 2012


**REFERENCE BOOK**


1. Data Structures and Algorithms, G. A. Vijayalakshmi Pai TMGH, New Delhi 6thReprint 2011
2. Data Structures Using C-1000 Problems and Solutions, Sudipta Mukherjee TMGH, New Delhi, Second Reprint 2010
3. Introduction to Data structures Using C, Venkatesh N. Baitipuli University Science Press, Chennai First Edition, 2009
4. Classic Data Structures Debasis Samanta Prentice Hall of India, New Delhi 2009 / Second Edition
5. Principles of Data structures using C and C++ Vinu V. Das New Age International Publishers, New Reprint 2008
6. Data structures Using CISRD Group TMGH, New Delhi Ninth Reprint 2011
7. Fundamentals of Data structures in C Horowitz, sahni Anderson- freed University Press, Hyderabad Second Edition
8. Data and file structures Rohit Khurana Vikas Publishing Ltd First Edition 2010


**LAB EXERCISES**

1. Write a program in 'C' to perform PUSH and POP operations in stack by using array.

2. Write a program in 'C' to display the reverse of a string using a stack.
3. Write a program in 'C' to evaluate a post fix expression.
4. Write a program in 'C' to create a queue containing ten elements and perform delete and insert operations using array.
5. Write a program in 'C' to implement recursive function.
6. Write a program in 'C' to create a singly linked list containing at least five elements. Make necessary assumptions.
7. Write a program in 'C' to delete the first node that contains an integer data item of a single linked list.
8. Write a program in 'C' to create a binary tree.
9. Write a program in 'C' for pre-order traversal of a binary tree.
10. Write a program in 'C' for binary searching
11. Write a program in 'C' to sort 'N' Numbers using Insertion sort.
12. Write a program in 'C' to sort 'N' Numbers using bubble sort.
13. Write a program in 'C' to sort 'N' Numbers using selection sort.
14. Write a program in 'C' to sort 'N' Numbers using s Quick Sort

**SCHEME OF VALUATION**

| | |
|---|---|
| Write any Two programs | 20 Marks |
| Execute any One program | 20 Marks |
| Result with printout | 10 Marks |
| VIVA - VOCE | 10 Marks |
| **TOTAL** | **60 Marks** |

**HARDWARE REQUIREMENT :**

- Desktop Computers –40Nos
- Laser Printer – 1Nos

**SOFTWARE REQUIREMENT :**

- C – Compiler with Editor

**INSTRUCTIONAL STRATEGY**

This subject clears all fundamentals of programming techniques. Teachers should stress on explaining all the techniques and algorithm in detail in theory sessions. The students should be asked to convert their ideas about a problem into and algorithms in theory class and them write programs for the algorithms. Finally all the programmes should be run on computers. This will help the students to have clear concepts of programming.

## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 6 | 8 |
| 2 | 6 | 8 |
| 3 | 4 | 7 |
| 4 | 6 | 7 |
| 5 | 10 | 8 |
| 6 | 10 | 8 |
| 7 | 10 | 8 |
| 8 | 8 | 8 |
| 9 | 4 | 8 |
| **Total** | **64** | **70** |

# OBJECT ORIENTED CONCEPTS

**Subject Code : 054006**

| L | T | P |
|---|---|---|
| 4 | - | 5 |

**RATIONALE**

Today almost every branch of computer science is feeling presence of object-orientation. Object oriented technology is successfully incorporated in various fields of computer science. This subject will help in learning to write programs in any oops language using object - oriented paradigm. Approach in this subject is to take Java as a language that is used as a primary tool in many different areas of programming work.

**OBJECTIVES**

On completion of the following units of syllabus contents, the students must be able to

- Know the paradigms of programming languages.
- Understand the concepts of Object Oriented Programming.
- State the benefits and applications of Object Oriented Programming.

**DETAILED CONTENTS**

**1. Introduction C++ : (6 Periods)**

variables, types and type declarations, user defined data types; increment and decrement operators, relational and logical operators; if then else clause; conditional expressions, input and output statement, loops, switch case, arrays, structure, unions, functions, pointers; preprocessor directives

**2. OOP Concept: (8 Periods)**

Fundamentals of object oriented programming– procedure oriented programming Vs. object oriented program-ming (OOP). Object oriented programming concepts – Classes, reusability, encapsulation, inheritance, polymorphism, dynamic binding, message passing, data hiding

**3. Classes and Objects : (8 Periods)**

Creation, accessing class members, Private Vs Public, Constructor and Destructor Objects

**4. Member Functions : (10 Periods)**

Method definition, Inline functions implementation, Constant member functions, Friend Functions and Friend Classes, Static functions

**5. Overloading Member Functions: (10 Periods)**

Need of operator overloading, operator overloading, in stream/ out stream operator overloading, function overloading, constructor overloading

**6. Inheritance : (12 Periods)**

Definition of inheritance, protected data, private data, public data, inheriting constructors and destructors, constructor for virtual base classes, constructors and destructors of derived classes, and virtual functions, types of inheritance, single inheritance, hierarchical inheritance, multiple inheritance, hybrid inheritance, multilevel inheritance

**7. Polymorphism and Virtual Functions: (8 Periods)**

Importance of virtual function, function call binding, virtual functions, implementing late binding, need for virtual functions, abstract base classes and pure virtual functions, virtual destructors

**8. File and Streams: (4 Periods)**

Components of a file, different operation of the file, communication in files, creation of file streams, stream classes, header files, updating of file, opening and closing a file, file pointers and their manipulations, functions manipulation of file pointers, detecting end-of-file

**RECOMMENDED BOOK**


1. Object Oriented Programming in C++ by E. Balaguru swamy, Tata Mc Graw Hill Education Pvt Ltd , New Delhi
2. C++ by Robert Lafore, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
3. Mastering C++by K.R Venugopaland Rajkumar, T Ravishankar; Tata Mc Graw Hill Education Pvt Ltd , New Delhi
4. Object Oriented Programming and C++ by R Rajaram; New Age International(P) Ltd., Publishers, New Delhi
5. Schaum's Outline of Programming with C++ by John R. Hubbard
6. Object Oriented Programming using C++ by Vipan Arora, Eagle Publication, Jalandhar
7. Object Oriented Programming by D. Ravi Chandran Tata Mc Graw Hill


**LIST OF PRACTICALS**

1. Programming exercises on control flow statements in C++
2. Programming exercises on arrays, strings, function and pointers in C++

3. Writing programs to construct classes and deriving objects
4. Writingprogramsforconstructors,destructors,usingpublicandprivateaccess specifies
5. Programming exercises on operator overloading, type conversions and inheritance
6. Programming exercises on functional overloading
7. Writing programs on stream computation.
8. Implementation of a mini project in C++
9. Introduction to latest ANSI C++ Compiler and elaboration of short comings of Turbo C++Compiler

## SCHEME OF VALUATION

| | |
|---|---|
| Write any Two programs | 20 Marks |
| Execute any One program | 20 Marks |
| Result with printout | 10 Marks |
| VIVA - VOCE | 10 Marks |
| **TOTAL** | **60 Marks** |

**HARDWARE REQUIREMENT :**

- Desktop Computers –40Nos
- Laser Printer – 1Nos

**SOFTWARE REQUIREMENT :**

- C++ – Compiler with Editor

## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 6 | 9 |
| 2 | 8 | 9 |
| 3 | 8 | 9 |
| 4 | 10 | 9 |
| 5 | 10 | 9 |
| 6 | 10 | 9 |
| 7 | 8 | 9 |
| 8 | 4 | 7 |
| **Total** | **64** | **70** |

# INTERNET AND WEB TECHNOLOGY

**Subject Code : 054004**

| L | T | P |
|---|---|---|
| 4 | - | 5 |

**RATIONALE**

The main aim of this subject is to introduce the building blocks of Internet and web i.e. HTML, CSS, Java Script, JSP. Through various examples the course will describe how to design web pages , dynamic and interactive web pages client-side and server-side scripting.

**OBJECTIVES**

On completion of the following units of syllabus contents, the students must be able to

- Create local HTML pages and move them to a remote web server.
- Design and develop basic web pages using HTML5 and CSS.
- Using SVG in HTML5
- Use graphics and tables in Web Pages.
- Link pages so that they create a Website.
- Design and develop web pages using CSS styles, internal and/or external style sheets.
- Design and develop web pages using CSS for layout.
- Use operators, loop constructs and functions of JavaScript.
- Understand how to construct input and output boxes using Java Script.
- Discuss about events and Event Handlers in JavaScript.
- Differentiate server side scripting and client side scripting.
- List the advantages and disadvantages of JSP.
- Discuss about JSP elements and implicit objects.
- Write simple JSP scripts.

**DETAILED CONTENTS**

**1. INTERNET & HTML 5 : (15 Periods)**

Introduction to Internet: Definition of Internet – History of Internet - Packet Switching Different types of Connections : Dial-up connection – ISDN – Advantages and Disadvantages – ASDL Connection – Advantages and Disadvantages –DSL – Leased Line – Satellite Connections - Modem - Cable Modem – Internet tools - Web server – Domain name - Search

Engines –- Web browser – IP address – Versions ( concepts only) - Internet Protocols – TCP/IP – FTP – HTTP – Tel Net –WAIS.- GPRS – Definition. EDGE – 2.75 G – 3 G – 4G Concepts only

Introduction to HTML: Introduction - Basic Tags of HTML - HTML Tag - TITLE Tag – BODY Tag ; Formatting of Text : Headers - Formatting Tags: BOLD, ITALICS, UNDERLINE, PARAGRAPH, TT, STRIKETHROUGH, EM, BR and HR tags - PRE Tag -FONT Tag – Special Characters - Working with Images - META Tag

**2. HTML 5 & CSS3 : (20 Periods)**

HTML5:What is HTML5?-Difference between HTML&HTML5- New elements in HTML5 - canvas elements - Media elements –Form elements-Semantic and structural element - New graphic elements: <svg> and <canvas>. Advanced HTML: Links - Anchor tag – Lists - Unordered Lists - Ordered Lists –Definition Lists; Tables - TABLE, TR and TD Tags - Cols pan and Rows pan;

Frames: Frame set –FRAME Tag–Frame inside other frames – NO FRAMES Tag; Forms: FORM and INPUT Tag –Text Box-Radio Button – Checkbox –SELECT Tag and Pull Down Lists : Hidden - Submit and Reset ; Some Special Tags: COL GROUP -THREAD, TBODY, TFOOT - _blank, _self, _parent, _top – IFRAME –LABEL - Attribute for <SELECT> TEX TAREA .

Introduction –Features –Style Sheet basics - Working with CSS files –Syntax - Types of Style Sheets Inline Styles - Embedded Styles - External or Linked Styles What is CSS3? Animation – Borders – Backgrounds – Fonts – Multiple columns – Text effects. Formatting Text and Fonts: Font Families Font Size Kerning, Leading, and Indenting - Formatting Colors and Backgrounds: The Color Attribute The Background Attribute - Background Colors and Images Exploring CSS Class and ID Attributes: Defining the CSS Class Attribute – Defining the CSS ID Attribute - Dynamic effects with CSS - Lists- Tables – Forms - simple Examples using above properties.

**3. CLIENT SIDE SCRIPTING (JAVA SCRIPT): (15 Periods)**

JavaScript Basics : Need of scripting languages – Variables and Data Types : Declaring Variables –Life span of variables - Data Types - Operators : Assignment, comparison, computational and logical operators - Control Structures : Conditional Statements – Loop Statements : for, while, for in, break and continue statements Object-Based Programming and Message boxes: Functions - Executing Deferred Scripts - objects : Document object Model, Predefined objects, Array object, History object, Location object - Dialog Boxes - Alert Boxes - Confirm Boxes - Prompt Boxes Javascript with HTML: Events - Event Handlers : on Load and on Unload-

onFocus and onBlur – onError - Forms : Forms Array – Form element properties – Example , Using JavaScript URLs : Client-side Image maps – Server Side Image Maps – Status bar – Cookies – Live Connect – Java Console – Java Script to Java – Java to JavaScript Communication.

**4. SERVER SIDE SCRIPTING (JSP) : (14 Periods)**

Introduction: Client side scripting versus Server Side scripting – JSP Vs Javascript Advantages and disadvantages of JSP – Client and server responsibilities – Installing and configuring Tomcat server –JSP Architecture –Life cycle of a JSP page - JSP vs Servlets –JSP Vs ASP.NET –List of JSP servers JSP Elements: Comments –Directives: Page, Include and taglib directives –Scripting elements: Declarations - Scriplets –expressions –Simple JSP page 4.3 Implicit objects: Request, response, pagecontext, application, out, config, page, session, exception –Scope: Application –Session –Request

**TEXT BOOK**


1. Web Development and Design Foundations with HTML5 Terry Felke - Morris Pearson 8th Edition
2. JavaScript the Complete Reference Powell, ThomasMC Grawhill 3rd Edition
3. HTML & CSS: The Complete Reference Thomas Powell MC Grawhill Fifth Edition
4. JSP: The Complete Reference Phil Hanna MC Grawhill
5. The Internet Douglas E. Comer Prentice Hall


**REFERENCE BOOK**


1. Pro HTML5 and CSS3 Design Patterns Dionysios Synodinos, Michael Bowers, Victor Sumner Springer India Private Limited (2012)


**LAB EXERCISES**

1. Design a HTML page describing your profile in one paragraph. Design in such a way hat it has a heading, a horizontal rule, three links and your photo. Also, write three HTML documents for the links. Include facilities for forward, backward and HOME
2. Design a HTML page about computer languages. List the language. Each Language's name is a link. Prepare separate HTML documents for each language and call them in the appropriate link.
3. Design a single page website for your polytechnic containing a description of the courses offered. It should also contain some general information about the college such as its history, the campus, its unique features and so on. The site should be colored and each section should have a different color.

4. Develop a web page using CSS to create a time table for the class using different border style
5. a) Write a Java script code that converts the entered text to uppercase
   b) Write a Java script code to validate the username and password The username and password are stored invariables
6. Write a Java Script code using frames and Events (When a cursor moves over an object it should display the specification of the object in another frame )
7. Create a site containing banner advertisement at the top of the page. The ads are changed every 10 or 15seconds
8. Write Jquery Program for Count the number of milliseconds between the two click events on a paragraph
9. Write Jquery Program for Fade in and fade out all division elements
10. Write Jquery Program for Disable/enable the form submit button&Blink the text.
12. Collect the definitions of 5 items in Open Source. These definitions are stored in two string arrays name[] and defn[]. Write a JSP which has these two arrays and supplies the definition on request. Write a HTML document which gets the user input of the name of the item and sends the request to the JSP.
11. Write a JSP code to manipulate cookies
13. Write a JSP code to upload data from client side.
14. Write a program to check how many users have visited a website. Use Application object.
15. Write a Code in Java Script to count number of times you move over a link or record.

**SCHEME OF VALUATION**

| | |
|---|---|
| Writing answer for any two program | 20 Marks |
| Executing programs | 20 Marks |
| Result with printout | 10 Marks |
| VIVA - VOCE | 10 Marks |
| **TOTAL** | **60 Marks** |

**HARDWARE REQUIREMENT**

Desktop Computers – 36 Nos

Printer – 1 No

**SOFTWARE REQUIREMNT**

Notepad or any Text Editor

HTML5 supporting browsers (Anyone)

- Internet Explorer10
- Opera11.60
- Chrome19
- Safari5.1

**SUGGESTED DISTRIBUTION OF MARKS**

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 15 | 15 |
| 2 | 20 | 25 |
| 3 | 15 | 15 |
| 4 | 14 | 15 |
| **Total** | **64** | **70** |

# RELATIONAL DATA BASE MANAGEMENT SYSTEMS

**Subject Code : 054005**

| L | T | P |
|---|---|---|
| 4 | - | 5 |

**RATIONALE**

The Database Management system is a collection of programs that enables to store, modify and extract information from a database. The primary resource that fuels knowledge power is the database. Organizations are employing mechanisms to effectively manage and utilize the data stored in the database. Relational Database management System has been developed to harness the information stored in the database.

The major objectives of this subject is to provide a strong formal foundation in Database Concepts, technology and practice to the students to enhance them into well informed application developers. After learning this subject, the students will be able to understand the designing of RDBMS and can use any RDBMS package as a back end for developing database applications.

**OBJECTIVES:**

On completion subject, the students must be able to

- Define data, database, database Management systems and data base models.
- Compare file processing and database system.
- Study about architecture of DBMS.
- Understand the concept of Data warehousing, Big Data and client/Server Technology
- State CODD's Rules.
- Explain normalization and explain different types of Normal Forms.
- Create Normalized Database structure files.
- Perform all database DDL, DML, DCL, and all related commands.
- Write Logical and Conditional statement for Database Query.
- Write procedures and functions.
- Create and use Triggers.
- Understanding Data warehousing, Big data and No SQL

**DETAILED CONTENTS**

**1. Introduction : (8 Periods)**

Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification

of DBMS Users; Actors on the scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers, Workers behind the scene (DBMS system designers and implementers, tool developers, operator and maintenance personnel)

**2. Database System Concepts and Architecture : (10 Periods)**

Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence; Logical data Independence, Physical data Independence. Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems

**3. Data Modeling using E.R. Model (Entity Relationship Model): (14 Periods)**

Data Models Classification; File based or primitive models, traditional data models, semantic data models, Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities

**4. Relational Model: (10 Periods)**

Relational Model Concepts: Domain, Attributes, Tuples and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key

**5. Normalization: (10 Periods)**

Data Redundancy, Concept of Normalization, Need of Normalization, Insert Delete and Update Anomalies, functional dependencies, Finding Candidate Keys using functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form, Lossless Join decomposition and dependency preservation, Set, Cardinality and Arity of Set, Cartesian Product, Join- Natural Join, Inner Join, Equi-join, Left and Right Outer Join, Full Join.

**6. SQL : Data base create : (12 Periods)**

Oracle DBA, Oracle Forms, Report Writer, Oracle Graphics, SQL Data types: Creating a Table, Creating table from table, Insertion of data into tables: Inserting single row of data into a table from another table, Updating the contents of a table: Deletion of all row and deletion of specified number of rows, Select command; Global data extract, Retrieval of specific columns from a table, Eliminations of duplicates from the select statement, Sorting of data in

a table, Selecting a data set from table data, Modifying tables: Adding new column, modifying existing columns, After table, Removing, Deleting, Dropping tables, data Constraints: Column level, table level Constraints, Computations in expression: Arithmetic, Logical operator, Range searching, Pattern matching, Oracle functions, Grouping data, Joins, Sub queries, Union, Intersect, minus clause, Indexes, Views, Sequences, Granting, Revoking statement.

**TEXT BOOKS**


1. My SQLPaul DuBios Addison Wesley (Fourth Edition)
2. Database System Concepts Silber Schatz A. and Korth H McGraw Hill Education (India) Pvt Limited, Sixth Edition
3. Murach's MySQL Joel Murach Shroff / Murach (2012)
4. NO SQL Distilled PRAMOD J. SADALAGE MARTIN FOWLER Addison Wesley (First Edition)


**LAB EXERCISES**

**PART - A**

1. Install, configure and connect to MySQL server and MySQL workbench in Windows. Create a database, backup and restore the database.
2. Create a simple database for Social Networking Platform with the following entities.

   **a. users -table**

   id - auto increment, primary key field username - varchar (60) email - varchar (255) address - varchar (150) dob - timestamp is_active - TINYINT registered_on - timestamp last_logged_on - timestamp

   **b. friends -table_name**

   id - auto increment, primary key field user_id - unsigned INT, NOT NULL friend_name - varchar(60)

   **c. users_profiles**

   id - user_id location

**Perform the following operations on above entities.**

i) Create table with fields of appropriate data types.

ii) Verify the table created using DESCRIBE command

iii) Insert 10 users and some friendship data in friends table

iv) Add a 'gender' field of type CHAR(1). Allow NULL values for this field.

v) Rename friends table to users_friends

vi) Modify the dob field type to date_of_birth.

vii) Remove the fieldis_active

viii) Drop the table users_profiles

3. Perform the following operations on database created in Ex.no.2 using SELECT command.

   i) Fetch the most recent 5 register edusers.

   ii) Fetch all the friends of user_iduserx

   iii) Fetch all the users who are above 21 year sold.

   iv) Find the count of users who signed-up with gmail Id. (ie. users' email endswith @gmail.com)

   v) Fetch all the users who registered last month.

   vi) Fetch all users of 'Chennai' location.

   vii) Find actively monthly and weekly users count. ie. Count of users who have logged-in in the last 15days.

   viii)Find how many users who have not mentioned their gender.

4. a) Create a database 'Polytechnic_College'. Create 2 users namely 'Staff' and 'student'.

   - Grant all privileges to the user 'Staff 'and grant only 'create' privilege to 'student' user and verify the same .

   - Revoke all privileges to the 2 users and verify thesame.

   b) Implement the following transaction control statements

   i) Commit ii) Roll back iii) Save point

5. Create a table 'author' with the following structure author_id author_name address mobile book_title pages published_on

   i) Insert 4 books published by 3 authors each. (12records)

   ii) Fetch all the rows and observe how the data duplicated.

   iii) Apply 1st and 2nd normal forms to fixit.

6. Create table, "mail" with the following fields DATE TIME, # when message was sent srcuser VARCHAR(8), # sender (source user and host) srchost VARCHAR(20), dstuser VARCHAR(8), # recipient (destination user and host) dsthost VARCHAR(20), size BIGINT, # message size in bytes

   i) Sort the mail with the largest mail being first.

   ii) List the mails that is over 25MB

   iii) Remove the duplicate rows from result set.

iv) Execute a 'SELECT' query and store its result in a user defined variable. Use another 'SELECT' to display the value of the variable.

7. Create two tables with the following structure.

   **a) Requests table**

   request_id - UNSIGNED, INT, AUTO INCREMENT, PRIMARY KEY from_id - INT to_id - INT

   **b) requests_log table**

   request_id - FOREIGN KEY refers to request_id field of requests table request_status - enum ("PENDING", "APPROVED", "REJECTED") Create a view combining both tables to display all the requests along with their most recent status for the requests.

8. Create a library Table with proper fields. Create another table called Library1 and insert rows from Library table.

   **Hint:**

   CREATE TABLE new_table LIKE original_table;

   INSERT INTO new_table SELECT * FROM original_table;

9) Create a table to store the details of a customer in a Bank. Do some transactions like withdrawal, deposit. Find the Balance amount (Credit Limit). Based on customer's credit limit, write a program using IF or CASE flow control statements to find the customer levels namely SILVER, GOLD or PLATINUM.

   **If the Credit limit is**

   - greater than 50K, then the customer level is PLATINUM
   - less than 50K and greater than 10K, then the customer level isGOLD
   - less than 10K, then the customer level is SILVER

10) Create two tables with the following structure.

   **a) users - tablename**

   user_id - UNSIGNED, INT, AUTO INCREMENT, PRIMARY KEY

   username -VARCHAR (60) password - VARCHAR (128) email- VARCHAR (255)

   **b) users_profiles**

   user_id - FOREIGN KEY refers to user_id field of user table first_name - VARCHAR(60) last_name - VARCHAR(60) mobile - VARCHAR(15)

   i) SELECT all the users along with their profile details. (Hint: Use INNERJOIN)

ii) SELECT the users who do not have profiles (Hint: USE LEFT JOIN and exclude the rows generated with NULL values from joining table)

11. Create an employee database and create a stored procedure that accepts employee _Id as input and returns complete details of employee as output.

12. Create two tables with the following structure

**Authors**

author_id - INT

name VARCHAR (60)

titles_count INT -- holds the total number numbers of titles authored

**Titles**

author_id - INT

Name VARCHAR (512) -- name of the title

a. Create a trigger to update the titles count field of respective row in authors table each time a title gets inserted into titles table.

b. Create a log table with the following structure author_id -INT

Name VARCHAR (512) -- name of the title

Status VARCHAR (25) --- ADDITION, DELETION, UPDATION.

13. Create a table containing phone number, user name, address of the phone user. Write a function to search the address using phone number.

14. Create a table to store the salary details of the employees in a company. Declare the cursor id to contain employee number, employee name and net salary. Use cursor to update the employee.

15. Create a table 'stock' to contains the item code, item name, current stock, date of last purchase. Write a stored procedure to seek for an item using item code and delete it, if the date of last purchase is before one year from the current date. If not, update the current stock.

**SCHEME OF VALUATION**

| | |
|---|---|
| Writing answer for any two program | 20 Marks |
| Executing programs | 20 Marks |
| Result with printout | 10 Marks |
| VIVA - VOCE | 10 Marks |
| **TOTAL** | **60 Marks** |

## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 8 | 8 |
| 2 | 10 | 12 |
| 3 | 14 | 15 |
| 4 | 10 | 10 |
| 5 | 10 | 10 |
| 6 | 12 | 15 |
| **Total** | **64** | **70** |

# COMPUTER SYSTEM ORGANISATION AND ARCHITECTURE

**Subject Code : 054002**

| L | T | P |
|---|---|---|
| 4 | - | - |

## RATIONALE

Diploma in Computer Engineering have to be conversant with computer, its terminology and functioning. Computer Architecture is concerned with the structure and behavior of the various functional modules of the computer and their interaction, the course provides the necessary understanding of the hardware operation of digital computers.

## OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to

- Know the fundamental blocks of computer
- Realize the function of I/O in different operation modes
- Use of I/O processor
- Know about different memory types and their operations
- Study about the fundamental blocks ofCPU
- Know about the computer arithmetic
- Study the different processors

## DETAILED CONTENTS

**1. Introduction:** **(4 Periods)**

Define computer system organization and architecture

**2. Register Transfer and Micro Operations:** **(10 Periods)**

Register transfer language, bus and memory transfer, arithmetic logic micro operations. Basic computer organization and design, instructions and instructions codes, computer instruction. Timing and control, instruction cycles, memory reference instruction, input and output and interrupts, complete computer description

**3. Programming the basic Computer :** **(10 Periods)**

Machine language, assembly language, assembler, program loops, programming arithmetic, and logic operations, sub routines, input- output programming

**4. Micro Programmed Control:** **(10 Periods)**

Control memory, address sequencing, micro programs example

**5. Central Processing Unit :** **(10 Periods)**

General register organization, instruction formats, stacks organizations, addressing modes, data transfer and manipulation, programmed control, reduced instructions set computers, pipeline and vector processing, parallel processing, pipelining, arithmetic pipelines, RISC pipelines, Vector processing, array processors

**6. Computer Arithmetic Algorithm :** **(10 Periods)**

Addition and Subtraction algorithm, multiplication algorithms, division Algorithms, floating point arithmetic operations

**7. Input- Output Organization :** **(10 Periods)**

Peripheral devices, Input Output interface, asynchronous data transfer, modes of transfer, priority interrupt, Direct Memory Access (DMA), Input Output processor

**TEXT BOOK**


1. COMPUTER SYSTEM ARCHITECTURE, M. MORRIS MANO Prentice – Hall of India Pvt Limited THIRD EDITION
2. COMPUTER ORGANIZATION AND ARCHITECTURE, designing for performance William Stallings Pearson Publications. Eighth Edition


**SUGGESTED DISTRIBUTION OF MARKS**

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 4 | 5 |
| 2 | 10 | 12 |
| 3 | 10 | 12 |
| 4 | 10 | 11 |
| 5 | 10 | 10 |
| 6 | 10 | 10 |
| 7 | 10 | 10 |
| **Total** | **64** | **70** |

# COMPUTER NETWORK AND SECURITY

**Subject Code : 054001**

| L | T | P |
|---|---|---|
| 4 | - | - |

**RATIONALE**

The exponential growth of Engineering and Technology particularly information and communications engineering has benefitted the day-today life of entire mankind in all respects. The research and developments are continually happening in this field to fine tune and improve the field particularly also in Computer Networks and Security which directly or indirectly has impact on every man's daily life. As such the introduction of current and future trends and technology of computer networks and security would strengthen the knowledge and skills of engineering community in taking one-step further the prosperity of mankind.

**OBJECTIVES**

- Understand the concept of data communication.
- Discuss the advantages and disadvantages of different network topologies.
- Know different network classification based on different category.
- Study about different networking devices and their practical usages.
- Understand the different layers of OSI and their functions.
- Compare different LAN protocols.
- Study about ISDN and FDDI concepts and its applications.
- Identify the protocols used in TCP /IP and compare with OSI model. Understand the basic concepts of network security.
- Identify the attacks and threats.
- Study about Cryptography and different Cryptography Algorithms.
- Discuss about Network Security Applications.
- Know the applications of Network Security.
- Discuss about VPN and Firewalls.
- Identify the Wireless Security Issues.

**DETAILED CONTENTS**

**1. Introduction of Network Security, (10 Periods)**

Types of security threat- Describe security threats. • virus; • malware; • DDoS attacks; • Trojan; • worm; • spyware; • social engineering; • phishing attacks; • man-in-the-middle; • DNS poisoning. Describe vulnerabilities. • ports; • services; • code

**2. Mitigating security threats: (10 Periods)**

Describe security procedures. • Security policy; • securing the perimeter; • physical security; • securing the network; • securing devices; • securing applications; • O/S updates.

Describe common ways to protect data. • file and folder permissions; • encryption; • group policy.

Describe protection against malicious software. • anti-virus; • anti-malware

Describe types of firewalls. • packet filter; • stateful; • application level; • intrusion detection systems; • intrusion prevention systems.

**3. Cryptography: (16 Periods)**

Definition – Symmetric Encryption principle – Encryption Algorithms – DES, AES – Stream ciphers – RC4 – Digest function – Public key Cryptography Principles – RSA - Diffe - Hellman algorithm – Digital Signature (Definition Only) Network Security Application: Authentication applications –Encryption Techniques; Internet Security: Email security - IP security – Overview – Web security - SSL, TLS, SET ( Concepts only)

**4. Applications of network security : (16 Periods)**

Basic concepts of RAID levels, Hackers Techniques: Ethical hacking, hacking techniques, worms-Trojan horses-SPAM Security Mechanism: Introduction – Types of Fire walls – Packet filters – Application gateways– Limitations of fire walls. Intrusion: Intruders – Intruder detection – Classification of Intruder Detection systems – Honey pots. Wireless Security Issues: Definition and Types - Transmission Security, Authentication, WLAN Detection, Active Attacks and Passive Attacks

**5. Cyber Security and Indian IT Act : (12 Periods)**

What is cyber Security, Why cyber security is required, Cyber terrorism, Cyber war fare, Cyber espionage, How to Maintain Effective Cyber security, What is IT Act 2000, Features of I.T Act, Scheme of I.T Act, Application of the I.T Act, Amendments Brought in the I.T Act, Intermediary Liability.

**TEXT BOOK**


1. Data Communication and networking, Behrouz A. Forouzen Tata McGraw-Hill, New Delhi Fifth Edition
2. NetworkSecurity Essentials, William Stallings Pearson Publications. Fifth Edition
3. CRYPTOGRAPHY AND NETWORK SECURITY William Stallings Pearson Publications. Sixth Edition

## SUGGESTED DISTRIBUTION OF MARKS

| Topic | Time Allotted (Period) | Marks Allocation |
|---|---|---|
| 1 | 10 | 13 |
| 2 | 10 | 13 |
| 3 | 16 | 15 |
| 4 | 16 | 15 |
| 5 | 12 | 14 |
| **Total** | **64** | **70** |

# INDUSTRIAL TRAINING

**Subject Code : 054053** **80 MARKS**

**(During Summer Vacation after IV Semester)**

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 6 weeks duration to be organised during the semester break starting after second year i.e. after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 30 and external assessment of 80 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weight age to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.

Teachers and students are requested to see the footnote below the study and evaluation scheme of IV Semester for further details.