DATA STRUCTURE

UNIT I

Data Type - Data Object - Data Structure: Data abstraction and abstract data type; Notion of an algorithm - Complexity measures: Rate of growth, basic time analysis of an algorithm; ordering notion-detailed timing analysis - space complexity.

Arrays: Arrays and their representation-Single and multidimensional arrays-row major and column major ordering-address calculation.

UNIT II

Stacks and Queues: Stacks and Queues-representation and Manipulation-Uses of stacks and Queues- Recursion, polish expressions

Storage Management: Dynamic storage management- Reclamation and compaction- Boundary Tag method.

UNIT III

Linked lists: Pointers and their uses- Continuous vs. linked storage. Singly and doubly linked lists- Operations on lists-representation of sparse matrices and polynomials using lists- Circular lists- generalized lists

UNIT IV

Trees: Trees-Binary and N-ary trees-Representation of trees-Tree traversal algorithms and advantages- Conversion of general trees to Binary trees-B trees- Applications

UNIT V

Sorting and Searching: Searching and sorting-Sequential, Binary and hashed Searching- Bubble sort, Insertion sort, shell sort, Merge sort and Quicksort-Comparison.

DBMS Theory

UNIT I

Introduction: Database system applications, database systems versus file systems, views of data, data models, database languages, database users and administrators, transaction management, database system structure, application architecture.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, unique key, generalization, aggregation, reduction of an ER diagram to tables.

UNIT II

Relational model: Structure of relational databases, relational algebra, tuple relational calculus, domain relational calculus.

SQL: Characteristics of SQL, advantages of SQL, types of SQL commands, SQL operators and their procedure, tables, views and indexes, queries and sub-queries, aggregate functions, insert, update and delete operations, joins, union, intersection, minus, cursors in SQL. Domain constraints, referential integrity, assertions, triggers, authorization and authentication. Relational database design & normalization: Functional dependencies, normal forms- First, second, third, BCNF, fourth and fifth normal forms, decomposition

UNIT III

Indexing and Hashing: Basic concepts, ordered indices, B-tree, B+ tree, static hashing, dynamic hashing, comparison of ordered indexing and hashing, index definition in SQL, multiple-key access. Query Processing & Optimization: Measure of query cost, selection operation, sorting, join operation, other operations

UNIT IV

Transactions: Transaction concept, atomicity and durability, concurrent execution, serializability, conflict and view, testing of serializability.

Concurrency Control: Concurrency Control, Locking Techniques for Concurrency control, Time stamping protocols for concurrency control, validation-based protocols

Recovery System: Failure classification, storage structure (RAID), recovery and atomicity, log based recovery, shadow paging

UNIT V

Object Oriented Database Concept: Data types and Object, Evolution of Object-Oriented Concepts, Characteristics of Object-Oriented Data Model. Object Hierarchies, Generalization, Specialization, Aggregation.

Object Schema. Inter-object Relationships, Similarities and difference between Object Oriented Database model and Other Data models. Object Oriented DBMS Architecture, Application Selection for Object Oriented DBMS, Data Access API (ODBC, DAO, ADO, JDBC, OLEDB)

PYTHON THEORY

UNIT I

INTRODUCTION TO PYTHON
Python installation, Python syntax, Scripts, Native Data Types, Booleans, Numbers, Lists, Tuple, Sets, Dictionaries, Comprehensions, List Comprehensions, Dictionary Comprehensions, Set Comprehensions

UNIT II

Strings and modules: String operation, Formatting, Bytes, Encoding, Regular Expressions, Verbose, module declaration, Importing modules, Objects, and Indenting as Requirement, Exceptions, Unbound Variables, Lambda Functions and map

UNIT III

Classes: Creating classes, instance methods, Instance Variables, Closures, Generators, Iterators,Assert, Generator Expressions

UNIT IV

Testing and files: Reading and Writing Text Files, Binary Files, Stream Objects, Standard Input,Output and Error modes, with statement

UNIT V

GUI in python: Components and events, root component, entry widgets, test widgets, check buttons, Serializing Objects, Pickle Files, Debugging, Introduction to Django framework

WEB TECHNOLOGY

UNIT I

Introduction of HTML: introduction, markup language, editing HTML: common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables: intermediate HTML tables and formatting: basic HTML forms, more complex HTML forms, HTML5: Input Types & Attributes, internal linking, creating and using image maps

UNIT II

Java script Introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction, program modules in java script - function definitions, duration of identifiers, scope rules, recursion, java script global functions. Java script arrays: introduction, array-declaring and allocating arrays, references and reference parameters – passing arrays to functions, multiple subscripted arrays, introduction to DHTML and JQuery.

UNIT III

Cascading Style Sheets: introduction, inline styles, external style sheets, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the CSS box model, user style sheets

UNIT IV

HTML: HTML form using GET, POST, REQUEST, SESSION, COOKIE variables, Sending e- mail, Database Operations with PHP, Connecting to My-SQL (or any other database), selecting a db.

UNIT V

Introduction to PHP & web server Architecture Model Overview of PHP Capabilities, PHP HTML embedding tags & syntax, Simple script examples, PHP & HTTP Environment variables. PHP Language Core-Variables, constants, data types, PHP operators, flow control & loops, Arrays, string, functions Include & require statements, Simple File & Directory access operations, Error handling, Processing.

OPERATING SYSTEM

UNIT I

Introduction to Operating Systems: Mainframe systems, desktop systems, multiprocessor systems, distributed systems, clustered systems, real-time systems, handheld systems. Feature migration and computing Environments.

Computer System Structures: Computer system operation, I/O structure, storage structure, storage hierarchy, hardware protection, network structure.

Operating System Structures: System components, operating system services. System calls, system programs, system structure, virtual machines.

UNIT II

Processes: Process concept, process scheduling, operations on processes, cooperating processes, Inter-process communication, communication in client-server systems.

Threads: Overview, multithreading models, threading issues.

UNIT III

CPU Scheduling: Basic Concepts, scheduling criteria, scheduling algorithms, multiple- processor scheduling, real-time scheduling, algorithm evaluation.

Process Synchronization: The critical section problem, synchronization hardware, semaphores, classical problems of synchronization, monitors.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

UNIT IV

Storage   and Memory   Management: Swapping,contiguous memory
     allocation, paging, segmentation, segmentation with paging.

Virtual Memory: Demand paging, process creation, page replacement, allocation of frames, thrashing.

File System Interface: File concept, access methods, directory structure, file system mounting, file sharing, protection.

File-System Implementation: File system structure, file-system implementation,directory implementation, allocation methods, free space management, efficiency and performance.

UNIT V

Protection: Goals of protection, domain of protection, access matrix, implementation of access matrix, revocation of access rights.

Security: The security problem, user authentication, program threats, system threats, security systems and facilities, intrusion detection, cryptography.

MIS & E-COMMERCE

UNIT I
Management Information Systems - Need, Purpose and Objectives- Contemporary Approaches to MIS – Business processes and Information Systems –Information systems function in Business-Use of Information Systems for competitive advantage - MIS as an instrument for the organizational change: Management issues – Types of Business Information Systems.

UNIT II
Enhancing Decision Making: Information, Management and Decision Making - Models of Decision Making - Classical, Administrative and Herbert Simon's Models - Attributes of information and its relevance to Decision Making - Types of information, Decision Support Systems - Group Decision Support Systems –- Executive Support Systems

UNIT III
E-commerce: Introduction, Definition of e-commerce, emergence of Internet, commercial use of Internet, history of e-commerce, advantages and disadvantages of e-commerce
Business models for e-commerce: B2C, B2B, C2C, C2B, brokerage model, aggregator model, infomediaries, communities, value-chain model, manufacturer model, advertising model, subscription and affiliate model

UNIT IV
Enabling technologies: Internet Client server applications, networks, Uniform Resource Locator (URL), search engines, software agents, Internet Service Providers(ISP), broadband technologies,Electronic Data Interchange(EDI).
E-payment systems: token-based system, card-based system, e-cash. E-cheque, e-banking, risks, data protection

UNIT V
E-marketing: characteristics, methods, e-marketing value-chain, site adhesion, browsing behavior model, e- advertising, e-branding, e-marketing strategies
E-security: Security risks, risk management issues, legal and ethical issues, security mechanisms, encryption, digital signature, digital certificates.

ADVANCED DATA STRUCTURE

UNIT I
Priority Queues (Heaps) – Model, Simple implementations, Binary Heap: Structure Property, Heap Order Property, Basic Heap Operations: insert, delete, Percolate down, Other Heap Operations
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UNIT II
Trees: Threaded trees and advantages, Applications: Decision trees, Game trees and expression parsing. Red-Black Trees – Properties of red-black trees, Rotations, Insertion, Deletion.
Multi-way Search Trees – 2-3 Trees: Searching for an Element in a 2-3 Tree, Inserting a New Element in a 2-3 Tree, Deleting an Element from a 2-3 Tree.

UNIT III
Graphs: Graphs and their representations: Matrix representation, List structure ,Graph traversal algorithm (DFS and BFS), Application of graphs. Single Source Shortest Path Algorithms: Dijkstra"s, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall"s Algorithm.

UNIT IV
Strings and their features: Strings-Representation and Manipulation using Arrays and lists- String matching algorithms. Brute force, Knuth-Morris-Pratt and Boyer-Moore strategies. The Huffman Coding Algorithm, Longest Common Subsequence Problem (LCS)
Tables: Decision tables-Symboltables-HashTables- representation Examples, implementation and Applications

UNIT V
Disjoint Sets – Equivalence relation, Basic Data Structure, Simple Union and Find algorithms, Smart Union and Path compression algorithm.
Review of Hashing: Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing,Extendible Hashing

DBMS LAB

1. Create a database having two tables with the specified fields, to computerize a library system of a MLSU.
   LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price)
   IssuedBooks (Accession number, Borrower)
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) Delete the record of book titled "Database System Concepts".
   c) Change the Department of the book titled "Discrete Maths" to "CS"
   d) List all books that belong to "CS" department.
   e) List all books that belong to "CS" department and are written by author "Navathe".
   f) List all computer (Department = "CS") that have been issued.
   g) List all books which have a price less than 500 or purchased between "01/01/1999" and "01/01/2004".

2. Create a database having three tables to store the details of students of Computer Department in your college, as per the given schema.
   Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number) Paper Details (Paper code, Name of the Paper)
   Student Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
   c) List all students who live in "Delhi" and have marks greater than 60 in paper 1.
   d) Find the total attendance and total marks obtained by each student.
   e) List the name of student who has got the highest marks in paper 2.

3. Create the following tables and answer the queries given below: Customer (CustID, email, Name, Phone, ReferrerID)
   Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo) BicycleModel (ModelNo, Manufacturer, Style)
   Service (StartDate, BicycleID, EndDate)
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
   b) List all the customers who have the bicycles manufactured by manufacturer"HONDA"
   c) List the bicycles purchased by the customers who have been referred by customer "C1"
   d) List the manufacturer of red colored bicycles.
   e) List the models of the bicycles given for service.

4. Create the following tables, enter at least 5 records in each table and answer the queries given below.

 EMPLOYEE (Person_Name, Street, City)
 WORKS (Person_Name, Company_Name, Salary)
 COMPANY (Company_Name, City)
 MANAGES (Person_Name, Manager_Name)

   a) Identify primary and foreign keys.
   b) Alter table emp
   c) Find the name of all managers who work for both Samba Bank and NCB Bank.
   d) Find the names, street address and cities of residence and salary of all employees who earn more than $10,000.
   e) Find the names of all employees who live in the same city as the company for which they work.
   f) Find the highest salary, lowest salary and average salary paid by each company.
   g) Find the sum of salary and number of employees in each company.
   h) Find the name of the company that pays highest salary.

5. Create the following tables, enter at least 5 records in each table and answer the queries given below.

 Suppliers (SNo, Sname, Status, SCity)
 Parts (PNo, Pname, Colour, Weight, City)
 Project (JNo, Jname, Jcity)
 Shipment (Sno, Pno, Jno, Quantity)

   a) Identify primary and foreign keys.
   b) Get supplier numbers for suppliers in Paris with status>20.
   c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.
   d) Get suppliers names for suppliers who do not supply part P2.
   e) For each shipment get full shipment details, including total shipment weights.
   f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.
   g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.
   h) Get the names of cities that store more than five red parts.
   i) Get full details of parts supplied by a supplier in London.
   j) Get part numbers for part supplied by a supplier in London to a project in London.
   k) Get the total number of project supplied by a supplier (say, S1).
   l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

PYTHON LAB

1. Write python program/ script to create a list and perform the following methods
    1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()

2. Write python program/ script to create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()

3. Write python program/ script to create a tuple and perform the following methods 1) Add items 2) len() 3) check for item in tuple 4)Access items

4. Write a python program to add two numbers, to print a number is positive/negative using if-else, to find the largest number among three numbers.

5. Write a python Program to read a number and display corresponding day using if_elif_else?

6. Python Program to Implement Conditionals and Loops

7. Python program to use functions and modules

8. Python program to read and write data from & to files in Python

9. Python program based on Classes and Objects

10. Python program based on inheritance

11. Python program based on lambda Function

12. Write a menu driven program to create with the following options
    1. TO PERFORM ADDITION
    2. TO PERFORM SUBTRACTION
    3. TO PERFORM MULTIPLICATION
    4.TO PERFORM DIVISION