DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS
3150302 (DC)

COURSE OBJECTIVES

- Provide basic knowledge of computer operating system structures and functioning.
- Compare several different approaches to memory management, file management and process management
- Understand various problems related to concurrent operations and their solutions.

Unit- I

Basics of operating systems: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.
Process management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit-II

Process synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.
Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit-III

Memory management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit-IV

Storage management: Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, RAID Structure.

Unit-V

File system interface: File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.
System Protection: Goals, Principles, Domain of Protection, Access Matrix, Access Control.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, Internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. **Outline** the basic concept of operating systems
CO2. **Analyze** the working of operating system
CO3. **Examine** the working of various scheduling/allocation approaches
CO4. **Measure** the performance of various scheduling/allocation approaches
CO5. **Develop** the Solution of various operating system problems/issues

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	1	2	1	1	1	1	3	3	3
CO2	3	3	3	3	3	1	1	1	1	1	1	3	3	3
CO3	3	3	3	3	3	2	1	1	1	1	1	3	3	3
CO4	3	3	2	3	2	1	1	1	1	1	1	3	3	3
CO5	3	3	3	3	2	1	1	1	1	1	1	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN & ANALYSIS OF ALGORITHMS
3150303 (DC)

COURSE OBJECTIVE:

- To introduce the topic of algorithms as a precise mathematical concept.
- To demonstrate the familiarity with major algorithm design paradigms and methods of analysis.
- To design efficient algorithms for common computer engineering problems.
- To enhance the skills using well-known algorithms and data structures for solving real-life problems.

Unit-I

Introduction to Computational Model: RAM model, Algorithms and its importance, Recurrences and Asymptotic Notations, Growth of function, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, Basic Tree and Graph Concept: Binary Search Trees, Height Balanced Tree, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the maximum and minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, greedy activity selection. **Minimum Cost Spanning Trees**: Prim's and Kruskal's Algorithm, knapsack Problem, Single Source Shortest Path: Dijkstra's single source shortest path algorithm, Huffman Coding.

Unit-IV

Dynamic Programming: Introduction, The principle of Optimality, Examples of Dynamic Programming Methods such 0/1 Knapsack, Travelling salesman problem, Floyds All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch and Bound**: Introduction and its Examples like – Travelling

Salesperson Problem etc. **NP Completeness**: Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete problem.

RECOMMENDED BOOKS:

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
- Introduction to Algorithms, Coreman Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullman, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES:

After Completion of this course, the students would be able to:

CO1: **Tell** the basic features of an Algorithms.

CO2: **Outline** major Algorithms and Data Structures.

CO3: **Apply** various algorithmic design paradigms.

CO4: **Compare** different design techniques to develop algorithms for computational problems.

CO5: **Design** algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	2	3	2	1	1	1	2	3	2
CO2	3	3	3	2	2	2	2	1	1	1	1	2	3	2
CO3	3	3	3	2	2	2	1	2	1	1	1	2	3	2
CO4	3	3	3	2	2	2	2	3	1	1	1	2	3	2
CO5	3	3	3	2	2	2	3	3	1	1	1	2	3	2

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DESIGN AND ANALYSIS OF ALGORITHM
3150303
List of Experiments

1. WAP to implement the following using array as data structure and analyze its time Complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Bucket sort f. Radix sort g. Heap sort h. Merge sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time Complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
2150304 (DC)(old)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints. Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc.Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Define** the terminology, features, classifications, and characteristics embodied in database systems.

CO2. **Identify** different issues involved in the design and implementation of database system.

CO3. **Analyse** database schema for a given problem domain.

CO4. **Justify** principles for logical design of databases, including the E-R modelling and Normalization approach.

CO5. **Apply** transaction processing concepts and recovery methods over real time data.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts &normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

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Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints. Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

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Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability, Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools, Database design for ORDBMS, ORBMS implementation and challenges, OODBMS, comparison of RDBMS, OODBMS and ORDBMS

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
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Course Articulation Matrix

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CO1	3	3	3	2	3					3	3	1	3	1
CO2	3	3	2	3	1					3	1	1	3	1
CO3	3	2	1	3	1						2	1	3	1
CO4	3	3	1	3	3						2	1	3	3
CO5	3	3	3	1	3	3					2	2	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

List of Experiments

1. Introduction to Structure Query Language (SQL)
   - **a)** Overview of SQL
   - **b)** Various Data Types in SQL
   - **c)** Various Commands in SQL
   - **d)** Various Constraints in SQL
2. Implementation of DDL commands of SQL with suitable examples
   - **a)** Create table
   - **b)** Alter table
   - **c)** Drop table
3. Implementation of DML commands of SQL with suitable examples
   - **a)** Insert
   - **b)** Update
   - **c)** Delete
4. Study and implementation of different types of constraints.
5. Implementation of different types of functions with suitable examples
   - **a)** Number function
   - **b)** Aggregate function
   - **c)** Character function
   - **d)** Conversion function
6. Implementation of different types of operators in SQL
   - **a)** Arithmetic operators
   - **b)** Logical operators
   - **c)** Comparison operators
   - **d)** Set operation
7. Implementation of different types of joins
   - **a)** Inner join
   - **b)** Outer join
   - **c)** Natural join
8. Study and implementation of
   - **a)** Group by and having clause
   - **b)** Order by clause
   - **c)** Indexing
9. Study and implementation of
   - **a)** Sub-queries
   - **b)** Views
10. Study and implementation of Database Backup and Recovery commands.

DATABASE MANAGEMENT SYSTEM
3150304 (DC)(New)

Skill-Based Mini Project List

1. Blood Bank Management System
2. Railway Management System
3. Airlines Management System
4. Courier Service Management System
5. Attendance Management System
6. Inventory Management System
7. University Management System
8. Online Shopping Management System
9. Dispensary Management System
10. Taxi Management System
11. Retail Shop Management System
12. Stadium Seat Booking Management System
13. Metro Rail Management System
14. Hospital Management System
15. Library Management System
16. Payroll Management System
17. Cooking Recipe Management System
18. Billing System for a Departmental Store
19. Pharmacy Management System
20. Hotel Management System
21. Car Showroom Management System
22. Bike showroom management system
23. Online Crime Report management system
24. Gas Booking System
25. Farmer Bidding System

PYTHON PROGRAMMING
3150309 (DC)

Course Objectives:

- To understand the fundamental concepts of Python.
- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Brief Introduction, Advantages, Disadvantages, Application, Python interpreter, Python Syntax, Comments, Variables, Data Types, Operators (unary, arithmetic, etc.), expressions, and statements (Assignment statements, Conditional statements, etc.), Numbers, Strings and string operations, Type Casting, Booleans

Unit II

Built-in data type: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.)
Control Statements: If statement, Elif statement, Else Statement, While Loop, For Loop (String and Number), break statement, Continue statement

Unit III

User defined Functions: Create, Call, Arguments, Types of arguments, Pass function, Return Values, Passing a List, Passing an Arbitrary Number of Arguments, Storing Functions in a Module, In-Built Functions, Recursion, Lambda function **Classes, and Objects:** Python Object Oriented Programming, Create class and object, Self-parameter, Scope

Unit IV

Files and Exceptions: Creating, Reading, updating, and deleting Files, File Operations, Assertions, **Exceptions**: Try and Except, user-defined Exception, Built-in exception **Debugging:** Programming Challenges, Classes of Tests, Bugs, and Debugging, Debugging examples.

Unit V

Modularization: Introduction to Python Modules, Standard Modules, create, Import, and use. **Packages**: Packages, PIP, Introduction to Python GUI packages **Graphical User Interfaces:** Event-Driven Programming Paradigm; Tkinter Module, Creating Simple GUI; Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames.

RECOMMENDED BOOKS

- "Python for Data Science For Dummies" by John Paul Mueller and Luca Massaron
- "Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili
- "Python Web Scraping Cookbook" by Michael Heydt
- "Python GUI Programming Cookbook" by Burkhard A.
- "Python for Finance" by Yves Hilpisch.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1: Recognize Python basic functions, operators, and Syntax.
CO2: Implement Python built-in functions and control statements.
CO3: Implement Python user-defined functions and classes.
CO4: Summarize file and exception handling in Python.
CO5: Create Python GUI.

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Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	3	1	1	1	1	1	1	3	3	-
CO2	3	3	3	1	3	1	1	1	1	1	1	3	3	-
CO3	3	3	3	2	3	1	1	1	1	1	1	3	3	-
CO4	3	3	2	2	3	1	1	1	1	1	1	3	3	-
CO5	2	2	3	3	3	1	1	1	2	3	3	3	3	-

1 - Slightly; 2 - Moderately; 3 – Substantially

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)

Course Objectives:

- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Setting up the Python environment (Anaconda, Jupyter Notebook), Basic syntax usage: variables, data types, and operators, First Python program, **Control Structures:** Conditional statements: if, elif, else, Looping constructs: for and while loops Nested control structures

Unit II

List/ Set/ Tuple operations: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.) **Strings:** Reverse, Palindrome, Character count, Replacing Character

Unit III

Matrix and Array: Define matrix and print, Arithmetic operation between Matrix,
Functions and Modules implementation: Defining and calling functions, Function parameters and return values, Scope and lifetime of variables, Importing and using modules, In-Built Functions, Recursion, Lambda function

Unit IV

Classes, and Objects: Create class and object, Self-parameter, Attribut and methods, Implement Inheritance and polymorphism.
File Handling: Read and write to files, Working with CSV and JSON file, Implement try-except blocks, Debug a piece of code

Unit V

GUI: Work with Canvas, draw geometric shapes, Fill colour, Creating Simple GUI, GUI packages, Tkinter, Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames, Widget window – Bg, Bd, Cursor, font, Fg, Command, Minimal Application

Reference Books

- “Python for Data Science For Dummies” by John Paul Mueller and Luca Massaron
- “Python Machine Learning” by Sebastian Raschka and Vahid Mirjalili
- “Python Web Scraping Cookbook” by Michael Heydt
- “Python GUI Programming Cookbook” by Burkhard A.
- “Python for Finance” by Yves Hilpisch.

Course Outcome

CO1: Implement Python built-in functions and control statements.
CO2: Implement Python user-defined functions and classes.
CO3: Create Python GUI.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	3	3	2	3	1	1	1	1	1	1	3	3	-
CO3	2	2	3	3	3	1	1	1	2	3	3	3	3	-

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)

List of Experiments

1. Python Program to
    a. Generate a Random Number
    b. Convert Kilometers to Miles
    c. Check if a Number is Positive, Negative or 0
    d. Print the Fibonacci sequence
    e. Find ASCII Value of Character
    f. Shuffle Deck of Cards
    g. Display Calendar
2. Python Program to
    a. Display the Fibonacci Sequence Using Recursion
    b. Find the Sum of Natural Numbers Using Recursion
    c. Find the Factorial of Number Using Recursion
    d. Convert Decimal to Binary Using Recursion
3. Python Program to Add Two Matrices, Transpose a Matrix, Multiply Two Matrices
4. Python Program to
    a. Check Whether a String is Palindrome or Not
    b. Remove Punctuations from a String
    c. Sort Words in Alphabetic Order
5. Python Program to Illustrate Different Set, Tuple, and List operations.
6. Python Program to Iterate Over Dictionaries Using for Loop
7. Python Program to Catch Multiple Exceptions in One Line
8. Python Program to Copy a File
9. Python Program to Get Line Count of a File
10. Python Program to Find All Files with .txt Extension Present Inside a Directory
11. Python Program to Return Multiple Values from a Function
12. Write a Python program to create a person class. Include attributes like name, country, and date of birth. Implement a method to determine the person's age
13. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.
14. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items and calculating the total price.
15. Create Python GUI using Tkinter
    a. Displaying Text and Images with Label Widgets
    b. Displaying Clickable Buttons with Button Widgets
    c. Getting User Input with Entry Widgets
    d. Getting Multiline User Input with Text Widgets
    e. Assigning Widgets to Frames with Frame Widgets
    f. Adjusting Frame Appearance with Relief

PROBLEM SOLVING USING PYTHON LAB

3150310(DLC)

Skill-Based Mini Project List

- Rock, paper, scissors game Python Project
- Password generator Python project
- QR code encoder and decoder python project
- Sudoku Solver game
- Create a Screen recorder using python.
- Make a Twitter Bot in Python
- Create an Auto login Bot
- Make Epidemic Help Bot
- Create a Product Availability checker for an online platform
- File Explorer in Python using Tkinter
- ToDo GUI Application using Tkinter
- Color game using Tkinter in Python
- Simple FLAMES game using Tkinter
- Simple registration form using Tkinte
- Sentiment Detector GUI using Tkinter