

VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Aziz Nagar Gate, C.B. Post, Hyderabad - 500 075, Telangana.



COURSE STRUCTURE & SYLLABI

R-22

For

B. Tech (Computer Science and Engineering)
(DATA SCIENCE)

B. Tech II Year I Semester

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1	PC	A223510	Mathematical Foundations of Computer Science	3	0	0	3
2	PC	A223504	Data Structures	3	0	0	3
3	BS	A223009	Probability & Statistics	3	1	0	4
4	ES	A223505	Computer System Architecture	3	0	0	3
5	PC	A223506	Database Management Systems	3	0	0	3
6	PC	A223584	Data Structures Lab	0	0	2	1
7	PC	A223585	Database Management Systems Lab	0	0	2	1
8	PC LAB	A223588	Skill development Course (Data Visualization - R Programming)	0	0	2	1
9	H&S	A223013	Quantitative Methods & Logical Reasoning	2	0	0	1
			Total	17	1	6	20

B. Tech II Year II Semester

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1	PC	A224511	Design & Analysis of Algorithms	3	0	0	3
2	PC	A224512	Operating Systems	3	0	0	3
3	PC	A224513	Object Oriented Programming through Java	3	0	0	3
4	PC	A224514	Software Engineering	3	0	0	3
5	PC	A224515	Introduction to Artificial Intelligence	2	0	0	2
6	PC LAB	A224591	Operating Systems Lab	0	0	2	1
7	PC LAB	A224592	Object Oriented Programming through Java Lab	0	0	2	1
8		A2245P1	Real-time Application Oriented Project	0	0	4	2
9	PC LAB	A224597	Skill Development Course (Node JS)	0	0	2	1
10	H & S	A224014	Professional Communication	2	0	0	1
			Total	16	0	10	20

B. Tech III Year I Semester

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1.	PC	A225534	Automata and Compiler Design	3	1	0	4
2.	PC	A225535	Introduction to Data Science	3	0	0	3
3.	PC	A225525	Computer Networks	3	1	0	4
4.	PE-1	Professional Elective-I		3	0	0	3
		A225526	1. Web Technologies				
		A225528	2. Linux Programming				
		A225527	3. DevOps				
		A225536	4. Object Oriented Analysis and Design				
5.	OE – I		Open Elective-I	3	0	0	3
6.	PC LAB	A2255A2	Data Science Lab	0	0	2	1
7.	PC LAB	A225017	Computer Networks Lab	0	0	2	1
8.	PC LAB	A2255A8	Skill Development Course (UI Designs-Flutter)	0	0	2	1
9.	MC – I	A225017	Gender Sensitization	2	0	0	0
			Total	17	2	6	20

B. Tech III Year II Semester

Sl. No	Course Category	Course Code	Course Title	L	T	P	Credits
1.	H & S	A226018	Business Economics and Financial Analysis	3	0	0	3
2.	PC	A226562	Essentials of Machine Learning	3	1	0	4
3.	PC	A226563	Big Data Analytics	3	0	0	3
4.	PE-II	Professional Elective-II		3	0	0	3
		A226564	1.Principles of Programming Languages				
		A226557	2.Distributed Data Bases				
		A226566	3.Information Security				
		A226567	4.Cloud Computing & Security				
5.	OE – II		Open Elective-II	3	0	0	3
6.	PC LAB	A2265B1	Big Data Analytics Lab	0	0	2	1
7.	H & S LAB	A226088	Advanced English Communication Skills Laboratory	0	0	2	1
8.		A2265P1	Industrial Oriented Mini Project / Internship	0	0	4	2
9.	MC- II	A226020	Environmental Science	2	0	0	0
			Total	17	1	8	20

B. Tech IV Year I Semester

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1.	PC	A2275G0	Predictive Analytics	3	0	0	3
2.	PC	A2275G1	Web and Social Media Analytics	3	0	0	3
3.	PE – III	Professional Elective-III		3	0	0	3
		A2275F1	1. Mobile Application Development				
		A2275F0	2. Internet of Things				
		A2275F2	3. Deep Learning				
		A2275G2	4. Full stack Development				
4.	PE – IV	Professional Elective – IV		3	0	0	3
		A2275F3	1. Advanced Data bases				
		A2275F5	2. Natural Language Processing				
		A2275F6	3. Block Chain Technologies				
		A2275G5	4. Quantum Computing				
5.	OE – III		Open Elective-III	3	0	0	3
6.	PC LAB	A2275C7	Predictive Analytics Lab	0	0	2	1
7.	PE LAB	PE- III Lab		0	0	2	1
		A2275C5	1. Mobile Application Development Lab				
		A2275C4	2. Internet of Things Lab				
		A2275C6	3. Deep Learning Lab				
		A2275C8	4. Full stack Development Lab				
8.		A2275PS1	Project Stage-I	0	0	6	3
			Total	15	0	10	20

B. Tech IV Year II Semester

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1.	PC	A2285J4	Semantic Web and Social Networks	3	0	0	3
2.	PC	A2285J6	E- Commerce	3	0	0	3
3.	PC	A2285J7	Data Science Applications	3	0	0	3
4.		A2285PS2	Project Stage-II (Including Seminar)	0	0	22	9+2
			Total	9	0	22	20

Professional Elective-I

1. Web Technologies
2. Linux Programming
3. DevOps
4. Object Oriented Analysis and Design

Professional Elective-II

1. Principles of Programming Languages
2. Distributed Data Bases
3. Information Security
4. Cloud Computing & Security

Professional Elective-III

1. Mobile Application Development
2. Internet of Things
3. Deep Learning
4. Full stack Development

Professional Elective - IV

1. Advanced Data bases
2. Natural Language Processing
3. Block Chain Technologies
4. Quantum Computing

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

1. Analyze elementary mathematical arguments.
2. Apply discrete mathematics problems that involve computing permutations and combinations of a set.
3. Analyze problems involving recurrence relations & generating functions.
4. Demonstrate various operations on discrete structures.
5. Apply graph theory models to solve the problems of networks.

UNIT - I

Foundations:

Basics, Sets, Statements, Connectives, Normal Forms, Fundamentals of Logic, Logical Inferences, First order logic and other methods of Proof, Rules of Inference for Quantified Propositions.

UNIT - II

Elementary Combinatorics:

Basics of Counting, Combinations and Permutations, Enumerating Combinations and Permutations with & without repetitions, constrained repetitions, Pigeon hole principle, Inclusion-Exclusion principle.

UNIT - III

Recurrence Relations:

Generating Functions, Calculating coefficient of Generating Function, Solving homogeneous Recurrence relations by substitution method and Generating Functions, the Method of Characteristic Roots, Binomial Theorem

Functions: Domain, Range, Inverse of functions, composite functions

UNIT - IV

Relations and Digraphs:

Relations and Directed Graphs, Special Properties of Binary Relations, Equivalence Relations, Ordering Relations, Lattice, Paths and Closures, Directed Graphs and adjacency matrices.

UNIT - V

Graphs :

Basic Concepts, Isomorphism and Sub-graphs, Trees and Their Properties, Spanning Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Text Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians by Joe L. Mott, Abraham Kandel, Theodore P. Baker, Second Edition, PHI, 2009.
2. Discrete Mathematical Structures with Applications to Computer Science, Tremblay J P and Manohar R, Tata McGraw Hill Publishing Company Limited, New Delhi, 2007.

Reference Books:

1. Discrete Mathematics R.K. Bisht, H.S. Dhami, OXFORD Higher Education.
2. Discrete Mathematics and its Applications II, Kenneth H Rosen, Tata McGraw Hill Publishing Company Limited, New Delhi, Sixth Edition, 2007.

DATA STRUCTURES

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

1. Understand the concepts of Stacks and Queues with their applications.
2. Analyze various operations on Binary trees.
3. Examine of various concepts of binary trees with real time applications.
4. Analyze the shortest path algorithm on graph data structures.
5. Outline the concepts of hashing, collision and its resolution methods using hash functions.

UNIT - I

Data Structures:

Introduction, Types of data structures, Static and Dynamic representation of data structure and comparison. **Stacks:** Stacks definition, operations on stacks, Representation and evaluation of expressions using Infix, Prefix and Postfix, Algorithms for conversions and evaluations of expressions from infix to prefix and postfix using stack.

Queues: Types of Queues- Circular Queue, Deque and operations.

UNIT - II

Trees: Basic terminologies, Types of Binary Tree: Complete and Full Binary Tree, Extended Binary Trees, Representation of Trees using Arrays and Linked lists (advantages and disadvantages), Tree Traversal, Representation of Algebraic expressions, Threaded Binary Trees.

UNIT - III

Advanced concepts on trees:

Representation and Creation of Binary Search Trees (BST), Operations on BST, Representation and advantages of AVL Trees, algorithms & operations on AVL Trees, Multi-way trees, Definition and advantages of B-trees, B+ Trees, Red-Black Trees.

UNIT - IV

Graphs:

Basic terminology, Representation of graphs: sequential representation, Adjacency, Path Matrix) Linked representation. Graph Traversals-Breadth First Search, Depth First Search algorithms. Spanning Tree, Minimum Spanning Trees- Prim's Algorithm, Kruskals Algorithm, Dijkstra Algorithm.

UNIT - V

Hashing:

General Idea, Hash Functions, collisions, Collision avoidance techniques, Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing, Rehashing, Extensible Hashing, Implementation of Dictionaries

Text Books:

1. Data Structures Using C, 2nd Edition Reema Thereja OXFORD higher Education
2. Fundamentals of Data Structures, 2nd Horowitz and Sahani, *Galgotia Publications* Pvt Ltd Delhi India.

Reference Books:

1. Data Structures, Seymour Lipschutz, Schaum's Outlines, Tata McGraw-Hill, Special Second Edition.
2. Data Structures Using C and C++II, Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein PHI Learning Private Limited, Delhi India.
3. Data Structures, A Pseudo code Approach with C, Richard F.Gillberg & Behrouz A. Forouzan, Cengage Learning, India Edition, Second Edition, 2005.

COMPUTER SYSTEM ARCHITECTURE

B.Tech. II Year I Sem. CSE-DS

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

1. Understand the various number System
2. Classify the basics of instruction sets
3. Demonstrate the design of functional units of a digital computer system.
4. Analyze various computer arithmetic operations.
5. Design a pipeline for consistent execution of instruction with minimum hazards

UNIT - I

Number Systems: Binary, Octal, Hex Decimal, and Conversions, range; Binary additions and subtractions (using 1c, and 2c), concept of overflow, representations of negative numbers using 1's and 2's complement and range; BCD numbers: Representation of 8421, 2421, Ex-3, Gray and self-complementary codes; additions and subtractions on 8421 codes.

UNIT - II

Structure of Computers: Computer types, functional units, basic operational concepts, VonNeumann architecture, bus structures, software, performance, multiprocessors and multicomputer, data representation, fixed and floating point and error detecting codes. Register Transfer and Micro Operations: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, shift microoperations, arithmetic logic shift unit

UNIT III:

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, instruction cycle, timing and control, memory reference instructions, input, output and interrupt.

Central Processing Unit: stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer (**RISC**).

UNIT IV:

Computer Arithmetic: Addition and subtraction, multiplication and division algorithms, floating point arithmetic operation, decimal arithmetic unit, and decimal arithmetic operations.

UNIT V:

The Memory System: Basic concepts, semiconductor RAM types of read only memory (ROM), cache memory, performance considerations, virtual memory, secondary storage raid, direct memory access (DMA).

Processor and control unit Basic MIPS implementation Building data path Control Implementation scheme Pipelining Pipelined data path and control Handling Data hazards & Control hazards Exceptions.

TEXT BOOK:

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS:

1. Computer Organization – Car Hamacher, Zvonks Vranesic, Safea Zaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson.

DATABASE MANGEMENT SYSTEMS

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

1. Understand the concepts of Entity-Relationship Model for enterprise level databases.
2. Analyze the database and provide restricted access to different users of database.
3. Understand various Normal forms to carry out schema refinement.
4. Analyze various Concurrency control protocols.
5. Understand working principles of Recovery algorithms

UNIT-I

Introduction to Database System Concepts:

Database-System Applications, Purpose of Database Systems, View of data, Database Language, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Feature, Structure of relational databases , database schema.

UNIT-II

Introduction to SQL:

Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

Intermediate and Advanced SQL:

Join Expressions, Views , Integrity Constraints, SQL Data Types, Authorization. Functions and Procedures, Triggers.

UNIT-III

Formal Relational Query Languages:

The Relational operations, The Tuple Relational Calculus, The Domain Relational Calculus.

Relational Database Design:

Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, BCNF.

UNIT-IV

Transactions:

Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity.

Concurrency Control:

Lock-Based Protocols, Deadlock Handling, Timestamp- Based Protocols, validation based protocols.

UNIT-V

Recovery System: Failure Classification, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 6th Edition, Tata McGraw-Hill.
2. Raghu Rama Kirshna, Johannes Gehrke, Database Management Systems|| Tata McGraw Hill 3rd Edition.

Reference Books:

1. Peter Rob & Carlos Coronel Database System Concepts Cengage Learning.
2. RamezElmasri, Shamkanth B. Navrate – Fundamentals of Database Systems 7th Edition, Pearson Education.
3. C.J. Date Introduction to Database Systems Pearson Education

DATA STRUCTURES LAB

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

1. Develop the programs on stacks and its applications.
2. Design and implementation of programs on Linked lists and Tree Traversals.
3. Apply Tree Concepts on advanced Trees
4. Implement Graph and its Traversing techniques
5. Apply Hashing techniques in real world applications

List of Experiments:

1. C Programs to illustrate concepts of arrays, structures, unions and enumerated data types.
2. Write a Program to implement stack, queue using linked list
3. Program to convert infix to postfix notation
4. Program to evaluate postfix notations
5. Write a program to implement doubly linked list and its operations
6. Program to illustrate tree traversals
 - a) In order
 - b) Pre order
 - c) Post order
7. Program to illustrate insertion, deletion and searching in Binary Search Tree.
8. Program to illustrate Insertion, deletion and Rotation on AVL Trees.
9. Program to illustrate Graph traversals
 - i. Breadth First Search
 - ii. Depth First Search
10. Program to implement hash table using linear and quadratic probing.
11. Implement Dictionaries using hashing.

DATABASE MANAGEMENT SYSTEMS LAB

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

At the end of the course student would be able to

1. Use the SQL commands such as DDL and DML statements to perform different operations.
2. Apply various Integrity constraints on the database tables.
3. Apply Joins to retrieve the information from multiple tables.
4. Design different Views of tables for different users.
5. Design and implement a PL/SQL program which includes procedures, functions, and triggers.

1. Database Schema for a customer-sale scenario

Customer (Cust id : integer, cust_name: string)

Item (item id: integer, item_name: string, price: integer)

Sale (bill no: integer, bill_date: date, cust_id: integer, item_id: integer, qty sold: integer)

For the above schema, perform the following.

- a. Create the tables with the appropriate integrity constraints.
- b. Insert around 10 records in each of the tables
- c. List all the bills for the current date with the customer names and item numbers
- d. List the total Bill details with the quantity sold, price of the item and the final amount
- e. List the details of the customer who have bought a product which has a price > 200.
- f. Give a count of how many products have been bought by each customer
- g. Give a list of products bought by a customer having cust_id as 5.
- h. List the item details which are sold as of today
- i. Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount.
- j. Create a view which lists the daily sales date wise for the last one week

2. Database Schema for a Student Library scenario

Student (Stud no : integer, Stud_name: string)

Membership (Mem no: integer, Stud no: integer)

Book (book no: integer, book_name: string, author: string)

Iss_rec (iss no: integer, iss_date: date, Mem no: integer, book no: integer)

For the above schema, perform the following.

- a. Create the tables with the appropriate integrity constraints.
- b. Insert around 10 records in each of the tables.
- c. List all the student names with their membership numbers
- d. List all the issues for the current date with student and Book names
- e. List the details of students who borrowed book whose author is KORTH.
- f. Give a count of how many books have been bought by each student.
- g. Give a list of books taken by student with stud_no as 5.

- h. List the book details which are issued as of today.
- i. Create a view which lists out the iss_no, iss_date, stud_name, book name
- j. Create a view which lists the daily issues-date wise for the last one week

3. Database Schema for a Employee-payscenario

Employee (emp_id:integer, emp_name:string)

Department (dept_id:integer, dept_name:string)

Pay details (emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)

Payroll (emp_id : integer, pay_date: date)

For the above schema, perform the following.

- a. Create the tables with the appropriate integrity constraints.
- b. Insert around 10 records in each of the tables.
- c. List the employee details department wise.
- d. List all the employee names who joined after particular date.
- e. List the details of employees whose basic salary is between 50,000 and 1,00,000
- f. Give a count of how many employees are working in each department.
- g. Give a name of the employees whose net salary > 1,00,000.
- h. List the details for an employee_id=5
- i. Create a view which lists out the emp_name, department, basic, deductions, net salary.
- j. Create a view which lists the emp_name and his net salary.

4. Database Schema for a Video Library scenario

Customer (cust_no: integer, cust_name: string)

Membership (Mem_no: integer, cust_no: integer)

Cassette (cass_no:integer, cass_name:string, Language:String)

Iss_rec(iss_no: integer, iss_date: date, mem_no: integer, cass_no: integer)

For the above schema, perform the following.

- a. Create the tables with the appropriate integrity constraints
- b. Insert around 10 records in each of the tables.
- c. List all the customer names with their membership numbers
- d. List all the issues for the current date with the customer names and cassette names
- e. List the details of the customer who has borrowed the cassette whose title is —The Legend
- f. Give a count of how many cassettes have been borrowed by each customer.
- g. Give a list of cassettes which has been taken by the Customer with mem_no as 5
- h. List the cassettes issues for today.
- i. Create a view which lists out the iss_no, iss_date, cust_name, cass_name
- j. Create a view which lists issues-date wise for the last one week

5. Database Schema for a student-Lab scenario

Student (stud_no: integer, stud_name: string, class: string)

Class (class: string, descrip:string)

Lab (mach_no: integer, Lab no: integer, description: String)

Allotment (Stud_no: Integer, mach_no: integer, day of week: string)

For the above schema, perform the following.

- a. Create the tables with the appropriate integrity constraints.
- b. Insert around 10 records in each of the tables.
- c. List all the machine allotments with the student names, lab and machine numbers
- d. List the total number of lab allotments daywise.
- e. Give a count of how many machines have been allocated to the 'CSE' class
- f. Give a machine allotment details of the stud_no 5 with his personal and class details.
- g. Count for how many machines have been allocated in **Lab_no 1** for the day of the week as -Monday
- h. How many students class wise have allocated machines in the labs.
- i. Create a view which lists out the stud_no, stud_name, mach_no, lab_no, day of week.
- j. Create a view which lists the machine allotment details for-Thursday.

6. **Create a procedure to find reverse of a given number.**
7. **Create a procedure to update the salaries of all employees as per the given data.**
8. **Create a procedure to demonstrate IN, OUT and INOUT parameters.**
9. **Create a function to check whether given string is palindrome or not.**
10. **Create a function to find sum of salaries of all employees working in department 10.**
11. **Create a trigger before/after update on employee table for each row/statement.**
12. **Create a trigger before/after delete on employee table for each row/statement.**
13. **Create a trigger before/after insert on employee table for each row/statement.**

SKILL DEVELOPMENT COURSE
(DATA VISUALIZATION THROUGH R PROGRAMMING)

B. Tech II Year I Semester- CSE-DS

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

At the end of this course, the student would be able to:

1. Apply operations on basic data types using R
2. Apply various operators on data frames, factors and list
3. Develop functions using iterative programming for real world problems
4. Analyse the data by plotting using R
5. Formulate linear and multiple regression models for time series data & web data

Week 1:

1. Write a R Program to create and name a Vector
2. Write a R program implement vector subsetting

Week 2:

1. Write a R Program to create and name a Matrix
2. Write a R program implement Matrix Subsetting

Week 3:

1. Write a R program to Access list elements and Manipulate list elements
2. Write a R program which converts list into a Vector

Week 4:

1. Write a R program to Control flow statements:
 - i. If condition
 - ii. If-else condition
2. Write a R program to implement Iterative statements:
 - i. For loop
 - ii. While loop
3. Write a R program to demonstrate usage of
 - i. Repeat
 - ii. Break
 - iii. Return
 - iv. Next

Week 5:

1. Write a R program to find reverse of a given number using functions
2. Write a R program to find factorial of a given number using recursion

Week 6:

1. Write a R program to demonstrate R Packages

Week 7:

1. Write a R program to calculate mean, median

Week 8:

1. Write a R program to implement
 - i. Factor levels
 - ii. Summarizing Factors
 - iii. Comparing Ordered factors

Week 9:

1. Write a R program to implement
 - i. Subsetting of Data Frames
 - ii. Extending Data Frames
 - iii. Sorting Data Frames

Week 10:

1. Write a R program to demonstrate
 1. Lapply()
 2. Sapply()
 3. Split()

TEXT BOOKS:

1. K.G. Srinivas, G.M. Siddesh "Statistical Programming in R", OXFORD Publications.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India.

DESIGN AND ANALYSIS OF ALGORITHMS

B. Tech II Year II Semester- CSE-DS

Course Code:

L	T	P	C
3	0	0	3

Course Outcomes:

1. Analyze the efficiency of algorithms
2. Develop algorithms divide & conquer, greedy and related problems
3. Examine the performance of Dynamic programming
4. Explain performance of algorithm using Backtracking
5. Analyze NP-Hard and NP-Complete problems

UNIT I

Introduction:

Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Disjoint Sets- disjoint set operations, union and find operations.

Divide and conquer:

General method, applications - Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT II

Graphs:

Breadth First Search, Depth First Search, spanning trees, connected and bi- connected components

Greedy method:

General method, Applications- Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT III

Dynamic Programming:

General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT IV

Backtracking:

General method, applications-n-queen problem, sum of subsets problem, graph colouring, Hamiltonian cycles.

Branch and Bound:

General method, applications - Travelling sales person problem, 0/1 knapsack problem-LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT V

Lower Bound Theory: Comparison Trees, **NP-Hard and NP-Complete problems:** Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Satisfiability problem, Clique Decision Problem (CDP), Node cover decision problem.

Text Books:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, Galgotia publications Pvt. Ltd.

References:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGraw Hill.
3. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

OPERATING SYSTEMS

B. Tech II Year II Semester- CSE-DS

L	T	P	C
3	0	0	3

Course Code:

Course Outcomes:

1. Understand the basic functions of Operating systems and system calls.
2. Analyze process scheduling and synchronization.
3. Understand the concepts of memory management.
4. Examine the concepts of MASS storage structure
5. Compare different protection methods of OS and understand the deadlock concepts.

UNIT - I

Operating System Introduction:

Operating Systems Objectives and functions, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, Virtual Machines.

UNIT - II

Process and CPU Scheduling:

Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switching, Preemptive Scheduling, Scheduling Criteria, Scheduling algorithms, thread scheduling, Case studies: Linux, Windows.

Process Coordination:

Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.

UNIT - III

Memory Management and Virtual Memory:

Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms, Thrashing.

UNIT - IV

File System Interface:

The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance.

Mass Storage Structure:

Overview of Mass Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management.

UNIT - V

Deadlocks:

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

Protection:

System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

Text Books:

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, W. Stallings, 6th Edition, Pearson.

References Books:

1. Modern Operating Systems, Andrew S Tanenbaum 3rd Edition PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhare, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B. Tech II Year II Semester- CSE-DS

Course Code:

Course Outcomes:

L	T	P	C
3	0	0	3

1. Understand OOP concepts to apply basic Java constructs.
2. Analyze different forms of inheritance and usage of Exception Handling
3. Understand the different kinds of file I/O and Multithreading in complex Java programs, and usage of Container classes
4. Contrast different GUI layouts and design GUI applications
5. Construct a full-fledged Java GUI application, and Applet with database connectivity

UNIT - I

Java Basics:

History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program

Fundamentals of Object Oriented Programming:

Object-Oriented Paradigm, Basic Concepts of Object Oriented Programming, Applications of OOP. Concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, static keyword, nested and inner classes, Strings, Object class.

UNIT - II

Inheritance & Polymorphism:

Introduction, Forms of Inheritance - specialization, specification, construction, extension, limitation, combination, Member access rules, super keyword, polymorphism- method overriding, abstract classes, final keyword.

Interfaces and Packages:

Introduction to Interfaces, differences between abstract classes and interfaces, multiple inheritance through interfaces, Creating and accessing a package, Understanding CLASSPATH, importing packages.

Exception handling:

Concepts of exception handling, exception hierarchy, built in exceptions, usage of try, catch, finally, throw, and throws, creating own exception sub classes.

UNIT - III

Files: Introduction to I/O Streams: Byte Streams, Character Streams. File I/O.

Multi threading: Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

Java.util package- Collection Interfaces: List, Map, Set. The Collection classes: LinkedList, HashMap, TreeSet, StringTokenizer, Date, Random, Scanner.

UNIT - IV

AWT: Class hierarchy, Component, Container, Panel, Window, Frame, Graphics.

AWT controls: Labels, Button, Scrollbar, Text Components, Checkbox, CheckboxGroup, Choice, List, Panes – ScrollPane, Dialog and Menu Bar.

Event Handling:

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

UNIT - V

Layout Manager: Border, Grid, Flow, Card and Gridbag.

Applets: Concepts of Applets, life cycle of an applet, creating applets, passing parameters to applets.

JDBC Connectivity: JDBC Type 1 to 4 Drivers, connection establishment, Query Execution.

Text Books:

1. Java- the complete reference, Seventh edition, Herbert Schildt, Tata McGraw Hill.
2. Database Programming with JDBC & JAVA, Second Edition, George Reese, O'Reilly Media.

Reference Books:

1. Programming in JAVA, Second Edition, OXFORD Higher Education.
2. Thinking in Java Fourth Edition, Bruce Eckel
3. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
4. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

SOFTWARE ENGINEERING

B. Tech II Year II Semester- CSE-DS

Course Code:

Course Outcomes:

1. Outline the framework activities for a given project.
2. Examine Right process model for a given project.
3. Analyze various system models for a given Context.
4. Understand various testing techniques for a given project.
5. Identify various risks in project development.

L	T	P	C
3	0	0	3

UNIT I

Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process:

Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), personal and team process models.

UNIT II

Process Models:

The waterfall model, Incremental process models, Evolutionary process model, Unified process model, Agile process model.

Software Requirements:

Functional and non-functional requirements, the software requirements document.

Requirements engineering process:

Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

UNIT III

System models:

Context Models, Behavioral models, Data models, Object models, structured methods.

Design Engineering:

Design process and Design quality, Design concepts, the design model, Modeling component level design: design class based components, conducting component level design.

User interface design:

Golden rules.

UNIT IV

Testing Strategies:

A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing techniques, Validation testing, System testing.

Product Metrics:

Software Quality, Metrics for Requirements Model- function based metrics, Metrics for Design Model-object oriented metrics, class oriented metrics, component design metrics, Metrics for source code, Metrics for Testing, Metrics for maintenance.

UNIT V

Risk Management:

Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software Reviews, Formal technical reviews, Software reliability, The ISO 9000 quality standards.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 8th edition McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.

References Books:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

B. Tech II Year II Semester- CSE-DS

Course Outcomes:

Student will be able to:

L	T	P	C
2	0	0	2

1. Understand the basic concepts and environment of Artificial intelligence.
2. Analyze various uniformed and informed search algorithm related to artificial intelligence.
3. Design various simple and complex network with real time applications.
4. Analyze the basic principles Markov Decision with real time applications.
5. Illustrate various types of Reinforcement Learning.

Unit – I

Concept of AI, History, Current Status, Scope, Intelligent Agents, Environments, Problem Formulations, Review of Tree and Graph Structures, State Space Representation, Search Graph and Search Tree.

Unit – II

Uninformed and Informed Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search : Generate & Test, Hill Climbing, Best first search, A* algorithm, Game Search, Alpha-Beta Pruning Genetic Algorithm

Unit – III

Probabilistic Reasoning : Probability, Conditional Probability, Bayes Rule, Bayesian Networks- Representation, Construction and Inference, Temporal Model, Hidden Markov Model, Dynamic Bayesian networks (DBN), Natural Language Processing using HMM

Unit – IV

Markov Decision Process, MDP Formulation, Utility Theory, Utility Functions, Value Iteration, Policy Iteration and Partially Observable MDPs.

Unit – V

Reinforcement Learning: Passive Reinforcement Learning, Direct Utility Estimation, Adaptive dynamic Programming, Temporal Difference Learning, Active Reinforcement Learning- Q Learning.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill

REFERENCE BOOKS:

1. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
2. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011

OPERATING SYSTEMS LAB

B. Tech II Year II Semester- CSE-DS

Course Code:

L	T	P	C
0	0	2	1

Course Outcomes:

1. Implement various CPU scheduling algorithms
2. Apply the memory management techniques
3. Implement Page replacement Techniques
4. Analyze File allocation strategies
5. Implement Deadlock avoidance

Programs:

1. Simulate the following CPU Scheduling Algorithms using C program:
a. FCFS b. SJF
2. Simulate the following CPU Scheduling Algorithms using C program:
a. Priority b. Round Robin
3. Write a C program to implement the producer-consumer problem using semaphores.
4. Write a C program for implementing memory allocation method for fixed partition using First fit.
5. Write a C program for implementing memory allocation method for fixed partition using Best fit
6. Write a C program for implementing memory allocation method for fixed partition using Worst fit
7. Simulate Paging Technique of Memory Management using C program.
8. Write a program to implement FCFS page replacement algorithm
9. Write a program to implement Optimal page replacement algorithm
10. Write a program to implement LRU page replacement algorithm
11. Write a C program to simulate the following file allocation strategies.
a) Sequential b) Indexed c) Linked
12. Write a program to implement Banker's algorithm for deadlock avoidance.

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

B. Tech II Year II Semester- CSE-DS

Course Code:

Course Outcomes:

L	T	P	C
0	0	2	1

1. Apply basic Java constructs and OOP to solve mathematical problems.
2. Apply Inheritance in Java programs and Analyze Exception Handling code
3. Implement File input/output and multithreading concepts in advanced Java programs.
4. Design different GUI applications using GUI layouts.
5. Apply Applet development and Database connectivity to build GUI applications

Week 1 & 2

1. Write a program to find total, average of given two numbers by using function with command-line arguments, static data members.
2. Write a program to illustrate class and objects.
3. Write a program to illustrate method & constructor overloading.
4. Write a program to illustrate parameter passing using objects.
5. Write a program to illustrate Array Manipulation.

Week 3

6. Write a program to illustrate different types of inheritances.
7. Write a java program to illustrate Method overriding.
8. Write a java program to demonstrate the concept of polymorphism (Dynamic Method Dispatch).
9. Write a program to demonstrate final keyword.

Week 4 & 5

10. Write a program to illustrate the use of creation of packages.
11. Write a java program to handle the situation of exception handling using multiple catch blocks.
12. Write a program to implement the concept of User defined Exceptions.

Week 6 & 7

13. Write a program to illustrate Multithreading and Multitasking.
14. Write a program to illustrate thread priorities.
15. Write a program to illustrate Synchronization

Week 8 & 9:

16. Write a program to implement StringTokenizer.
17. Write a program to read one line at a time, and write it to another file.

Week 10 & 11

18. Write a program to illustrate Event Handling (keyboard, Mouse events)
19. Write a program to illustrate applet life cycle and parameter passing.

Week 12:

20. Write a program to develop a calculator application using AWT.

Week 13

21. Write a program to illustrate JDBC.

SKILL DEVELOPMENT COURSE
(NODE JS)

L	T	P	C
0	0	2	1

B. Tech II Year II Semester- CSE-DS

Course Code:

Course Outcomes: At the end of the course, the student will be able to,

1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
2. Demonstrate Advanced features of JavaScript and learn about JDBC
3. Develop Server – side implementation using Java technologies like servlet
4. Develop the server – side implementation using Node JS.
5. Design a Single Page Application using React.

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages for the above 2 web applications.
4. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
5. Create an xml for the bookstore. Validate the same using both DTD and XSD.
6. Design a controller with servlet that provides the interaction with web application
7. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism using Cookies
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism using Sessions.
9. Develop an express web application that can interact with REST API to perform CRUD operations on student data
10. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
11. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.

Text Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.

3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press.

AUTOMATA AND COMPILER DESIGN

L	T	P	C
3	1	0	4

B. Tech III Year I Semester – CSE-DS

Course Outcomes:

1. Design of regular expressions for language constructs and conversions of NFA and DFA
2. Formulate tokens for various programming languages and understand the Top-Down parser, construction of LL.
3. Understand the Bottom-up parsers Techniques; get knowledge about the synthesized and inherited attributes.
4. Acquire knowledge about run time data structure like symbol table organization and different techniques.
5. Apply optimization techniques on the intermediate code and Generate the target code.

Unit - I

Introduction to Automata

Languages, Definitions, Regular Expressions, Regular Grammars, Acceptance of Strings and Languages, Finite Automaton Model, DFA, NFA, conversion of NFA to DFA, Conversion of Regular Expression to NFA.

UNIT - II

Introduction To Compilers: Definition of compiler, interpreter and its differences, the phases of a compiler

Context Free grammars: Context free grammars, derivations, parse trees, Ambiguity, Elimination of Ambiguity .

Top Down Parsing: Parse Trees, Ambiguous Grammars, Backtracking, LL (1), Recursive Descent parsing, Predictive parsing.

Unit – III

Bottom Up Parsing and Semantic Analysis

Bottom up parsing: Handle pruning ,Shift Reduce Parsing ,LR (k) grammar parsing, LALR (k) grammars.

Syntax Directed Translation:

Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, translation schemes.

UNIT - IV

Intermediate Code Generation: intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation.

Run-Time Environments and Symbol table:

Storage allocation strategies, Stack allocation of space, Access to non-local names, Contents of Symbol table, Data Structures for symbol tables.

UNIT - V

Code Optimization:

Principal sources of optimization, Loop optimization, Copy Propagation, Dead code elimination,

Redundant sub expression elimination.

Code Generation:

Object programs, problems in Code generation, A Machine Model, A Simple Code generator,

Register allocation and assignment, Peephole optimization.

Text Books:

1. "Introduction to Automata Theory, Languages and Computation". Hopcroft H.E. and Ullman J.D., 3rd Edition, Pearson Education.
2. Principles of Compiler Design, Alfred V Aho, Jeffrey D Ullman, Pearson Education, 2001.

Reference Books:

1. Daniel I. A.Cohen, Introduction to Computer Theory, Second Edition, John Wiley.
2. J P Trembly and P G Sorenson, The Theory and practice of Compiler Writing, McGraw Hill, 2005.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs, Modern Compiler Design, Wiley Dreamtech, 2006.

INTRODUCTION TO DATA SCIENCE

B.Tech III Year I Semester – CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, students will be able to

1. Understand the significance of data science tools and techniques.
2. Apply data cleaning, transformation and discretization techniques.
3. Analyze various inferential statistics and time-series methods.
4. Understand predictive analytics and its applications.
5. Apply data science techniques to deal with the real – world problems.

UNIT– I

Introduction: What Is Data Science, Where Do We See Data Science, How Does Data Science Relate to Other Fields, The Relationship between Data Science and Information Science, Computational Thinking, Skills for Data Science, Tools for Data Science, Issues of Ethics, Bias, and Privacy in Data Science.

UNIT– II

Data: Introduction, Data Types, Data Reduction, Data Collections, Data Pre-processing.

UNIT – III

Techniques: Introduction, Data Analysis and Data Analytics, Descriptive Analysis, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics, Exploratory Analysis, Mechanistic Analysis.

UNIT – IV

Data Collection, Experimentation, and Evaluation: Introduction, Data Collection Methods, Picking Data Collection and Analysis Methods, Evaluation.

UNIT – V

Solving Data Problems: Introduction, Collecting and Analyzing Twitter Data, Collecting and Analyzing YouTube Data, Analyzing Yelp Reviews and Ratings

Text Books:

1. A Hands-On Introduction to Data Science, Chirag Shah, Cambridge University Press, 2020.
2. EMC Education Services “DataScience and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, Wiley Publishers, 2012.

Reference Books:

1. Neil A. Weiss, "Introductory Statistics", 10th Edition, Pearson Education Limited, 2017.
- Jiawei Han, Micheline Kamber and Jian Pei, Data Mining: Concepts and Techniques, 3rd ed.

COMPUTER NETWORKS

L	T	P	C
3	1	0	4

B. Tech III Year I Semester – CSE-DS

Course Outcomes:

1. Understand the overview of reference models.
2. Illustrate various sub protocols in multi access protocols.
3. Analyze various routing algorithms and their operations.
4. Apply transport protocols for the given scenarios.
5. Evaluate various protocols and functionalities of application layer.

UNIT - I

Overview of the Internet:

Definition of networks, Topology, Protocol, Layering Scenario, TCP/IP Protocol Suite, The OSI Model, Internet history standards and administration, Comparison of the OSI and TCP/IP reference model.

Physical Layer:

Guided transmission media, wireless transmission media.

UNIT - II

Data Link Layer:

Design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.

Multiple Access Protocols:

ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer – CSMA/CD with Binary Exponential Backoff, Ethernet Performance, Switched, Fast, Gigabit, 10-Gigabit Ethernets, Data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT - III

Network Layer:

Network Layer Design issues, routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

Internetworking:

Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

UNIT - IV

Transport Layer:

Services provided to the upper layers, elements of transport protocol- addressing, connection establishment, connection release, Crash Recovery.

The Internet Transport Protocols:

UDP-RPC, Real Time Transport Protocols, The Internet Transport Protocols- Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

UNIT - V

Application Layer:

Introduction, providing services, Application layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

Text Books:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding Communications And Networks, 3rd Edition, W.A.Shay, Cengage Learning.
3. Introduction To Computer Networks And Cyber Security, Chwan-Hwa(John)Wu, J. David Irwin, CRC Press.

WEB TECHNOLOGIES (PROFESSIONAL ELECTIVE – I)

B.Tech III Year I Semester CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, student will be able to:

1. Develop static and dynamic web pages using HTML and javascript.
2. Understand the XML tags and to parse XML data with java.
3. Develop web applications using server side programming with PHP.
4. Implement web applications using JDBC and Servlets.
5. Apply web applications with JSP.

UNIT –I:

Introduction to HTML: HTML tags, Lists, Tables, Images, Forms, Frames, Cascading Style Sheets

Client Side Scripting: Java Script Language Declaring variables, Scope of variables, Functions, Objects in java scripts, Dynamic HTML with java scripts, Form Validation.

UNIT –II:

XML: Introduction to XML, Defining XML tags their attributes and values, Document Type Definition, XML Schema, Document Object Model, and XHTML.

Parsing XML Data: DOM and SAX Parsers in java.

UNIT –III:

Introduction to PHP:

Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc. Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies.

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. binary files listing directories.

UNIT –IV:

Introduction to Servlets: Common Gateway Interface (CGI), The Servlet API, Life cycle of a Servlet, Deploying a Servlet, Reading Servlet parameters, Reading Initialization parameters, Handling HTTP Request & Responses, Using Cookies and Sessions,

Introduction to JDBC: JDBC Drivers, JDBC Process, Connecting to a Database using JDBC

UNIT –V:

Introduction to JSP: The Anatomy of a JSP Page, Introduction to MVC Architecture, JSP Processing, Declarations, Directives, Expressions, Code Snippets, Implicit Objects, Using

Beans in JSP Pages, Using Cookies and Session for Session Tracking, Connecting to Database using JSP.

TEXT BOOKS

1. Programming the World Wide Web, 4th Edition by Robert W. Sebesta
2. Web Technologies, Uttam K Roy, Oxford University Press

REFERENCE BOOKS

1. Web Programming, Building Internet Applications , Chris Bates 2nd edition , Wiley Dreamtech
2. Java Script , D Flanagan, O'Reilly,SPD
3. Java Server Pages- Hans Bergsten , SPD O'Reilly

LINUX PROGRAMMING
(PROFESSIONAL ELECTIVE – I)

L	T	P	C
3	0	0	3

B.Tech III Year I Semester CSE-DS

Course Outcomes:

At the end of the course, student will be able to:

1. Understand and make effective use of Linux file handling utilities.
2. Solve problems using shell scripting language (bash).
3. Develop the skills necessary for systems programming.
4. Examine various operations involved in process and signal management.
5. Distinguish intra and inter process communication.

UNIT - I:

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities.

Sed-Scripts, Operation, Addresses, Commands, Applications, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, functions.

UNIT - II:

Shell programming with Bourne again shell(bash) - Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

UNIT - III:

Files and Directories- File Concept, File types, File System Structure, Inodes, library functions kernel support for files, system calls for file I/O operations- open, create, read, write, close.

Directories-Creating, removing and changing Directories- mkdir, rmdir, chdir.

UNIT - IV:

Process - Process concept, process identification, process control process- creation, waiting for a process, process termination, Kernel support for process, zombie process, orphan process.

Signals - Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

UNIT - V:

Inter Process Communication - Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes-creation, IPC between related processes using unnamed pipes, FIFOs- creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions. Message Queues- APIs for message queues Semaphores- APIs for semaphores Shared Memory- APIs for shared memory.

Sockets- Introduction to Sockets, basic functions of Socket.

TEXT BOOKS:

1. UNIX Concepts and Applications, 4th Edition, Sumitabha Das, TMH.
2. Beginning Linux Programming, 4th Edition, N. Mathew, R. Stones, Wrox, Wiley India Edition.

REFERENCE BOOKS:

1. UNIX and Shell Programming, B. A. Forouzan and R. F. Gilberg, Cengage Learning.
2. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson.
3. UNIX shell Programming, S. G. Kochan and P. Wood, 3rd edition, Pearson Education.

DEVOPS
(PROFESSIONAL ELECTIVE – I)

L	T	P	C
3	0	0	3

B.Tech. III Year I Sem. CSE-DS

Course Outcomes:

At the end of the course, student will be able to:

1. Understand the various components of DevOps environment.
2. Identify Software development models and architectures of DevOps
3. Use different project management and integration tools.
4. Select an appropriate testing tool and deployment model for project.

UNIT-I

Introduction to DevOps: Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

UNIT-II

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.

DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience.

UNIT-III

Introduction to project management: The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V

Testing Tools and Deployment: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the

system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible,

TEXT BOOKS:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley.

OBJECT ORIENTED ANALYSIS & DESIGN (Professional Elective – 1)

B. Tech III Year I Semester – CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Understand Object Oriented Software Development Process
2. Construct class and object diagrams for the given scenario
3. Model interaction diagrams, use case diagrams and activity diagrams for a given project
4. Design State diagrams involving processes and threads
5. Apply Unified Modeling Language Construct for Developing Structural Design of an ATM Project.

UNIT – I

Introduction to UML:

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture and Software Development Life Cycle.

UNIT – II

Basic Structural Modeling:

Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modeling:

Advanced classes, advanced relationships, Interfaces, Packages.

Class & Object Diagrams:

Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT – III

Basic Behavioral Modeling-I:

Interactions, Interaction diagrams.

Basic Behavioral Modeling-II:

Use cases, Use case Diagrams, Activity Diagrams.

UNIT – IV

Advanced Behavioral Modeling:

Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT – V

Architectural Modeling:

Component, Deployment, Component diagrams and Deployment diagrams

Case Study: The Unified library application, ATM System.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education 2nd Edition
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd-2003

Reference Books:

1. Analysis and Design and Unified Process, Craig Larman, Pearson Education.
2. Object Oriented Analysis, Design and Implementation, B.Dathan. S.Ramnath, Universities Press.
3. Learning UML 2.0, Russ Miles and Kim Hamilton, O'Reilly, SPD.

DATA SCIENCE LAB

B.Tech III Year I Semester CSE-DS

L	T	P	C
0	0	2	1

Course Outcomes:

1. To make students understand learn about a Data Science – Python Programming, way of solving problems.
2. To teach students to write programs in Python to solve problems.
3. Demonstrate the usage of built-in objects in Python.
4. Analyze the significance of python program development environment by working on real world examples
5. Implement numerical programming, data handling and visualization through NumPy, Pandas and Matplotlib modules.

1. INTRODUCTION TO PYTHON

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping-Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions

Week 1:

1. Demonstrate usage of branching and looping statements
2. Demonstrate Recursive functions
3. Demonstrate Lists

Week 2:

SEQUENCE DATATYPES AND OBJECT-ORIENTED PROGRAMMING

Sequences, Mapping and Sets- Dictionaries- -Classes: Classes and Instances-Inheritance- Exceptional Handling-Introduction to Regular Expressions using “re” module.

Lab Exercises

1. Demonstrate Tuples and Sets
2. Demonstrate Dictionaries
3. Demonstrate inheritance and exceptional handling
4. Demonstrate use of “re”.

Week 3:

USING NUMPY

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays- Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data: NumPy's Structured Array.

Lab Exercises

1. Demonstrate Aggregation
2. Demonstrate Indexing and Sorting

Week 4:

DATA MANIPULATION WITH PANDAS -I

Introduction to Pandas Objects-Data indexing and Selection-Operating on Data in Pandas- Handling Missing Data-Hierarchical Indexing - Combining Data Sets

Lab Exercises

1. Demonstrate handling of missing data
2. Demonstrate hierarchical indexing

Week 5:

DATA MANIPULATION WITH PANDAS -II

Aggregation and Grouping-Pivot Tables-Vectorized String Operations -Working with Time Series-High Performance Pandas- and query ()

Lab Exercises

1. Demonstrate usage of Pivot table
2. Demonstrate use of and query ()

Week 6:

VISUALIZATION AND MATPLOTLIB

Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots-Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars-Three-Dimensional Plotting in Matplotlib.

Lab Exercises

1. Demonstrate Scatter Plot
2. Demonstrate 3D plotting

Week 7:

Perform Data exploration and pre-processing in Python

Week 8:

Implement regularized linear regression

Week 9:

Implement Naive Bayes classifier for dataset stored as CSV file.

Week 10:

Implement regularized logistic regression

Week 11:

Build models using different Ensembling techniques

Week 12:

Build models using Decision trees

Week 13:

Build model using SVM with different kernels

Week 14:

Implement K-NN algorithm to classify a dataset.

Week 15:

Build model to perform Clustering using K-means after applying PCA and determining the value of K using Elbow method.

COMPUTER NETWORKS LAB

B. Tech III Year I Semester – CSE-DS

L	T	P	C
0	0	2	1

Course Outcomes:

6. Implement various network topologies and protocols of Physical and Data Link Layer
7. Design various networks and Apply Routing algorithms of Network Layer
8. Analyze the packets in Transport and Application Layer Protocols.

Programs:

Week1: Study of different types of Network cables and Implement the cross-wired cable and straight through cable and configure the Network Topology using Packet Tracer

Week 2: Implement the data link layer framing methods such as character stuffing and bit stuffing.

Week 3: Implementation of hamming code algorithm

Week 4: Implementation of CRC polynomial.

Week 5: Study of Basic Network Configuration Commands and Classification of IP address and Sub netting

Week 6: Connect the computers in Local Area Network and Observing Static and Dynamic Routing using Packet Tracer

Week 7: Implement Dijkstra's algorithm to compute the shortest path through a graph.

Week 8: Now obtain Routing table of each node using distance vector routing algorithm

Week 9: Take an example subnet of hosts. Obtain broadcast tree for it.

Week 10: Write a program for congestion control using leaky bucket algorithm.

Week 11: Capture and Analyze the Packets using Wire shark for the following Protocols IPv4, TCP, UDP

Week 12: Capture and Analyze the Packets using Wire shark for the following Protocols HTTP, DNS

**SKILL DEVELOPMENT COURSE
(UI DESIGN-FLUTTER)**

B.Tech. III Year I Sem. CSE-DS

L	T	P	C
0	0	2	1

Course Outcomes:

At the end of the course, student will be able to:

1. Knowledge on installation of various softwares.
2. Understanding of various widgets.
3. Application of animation to app.

Week 1:

Installation of Android studio & Flutter.

Week 2:

Create an application using Flutter to print hello world.

Week 3:

Create an application to implement Decision making and loops using Dart.

Week 4:

Create an application to demonstrate user defined functions using Dart.

Week 5:

Create an application to implement object oriented programming using Dart.

Week 6:

Create an application for platform basic widgets (Text, Image, and Icon).

Week 7:

Create an application for Layout widgets (Single child, Multiple Child).

Week 8:

Create an application to demonstrate Gesture Detector.

Week 9 & 10:

Create an application for Registration form.

Week 11:

Create an application to implement flutter calendar.

Week 12:

Create an application to implement Animated Text in Flutter.

TEXT BOOK:

1. Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development, 1st edition, Wrox publisher.

REFERENCE BOOKS:

1. Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2, Packt Publishing Limited.
2. Rap Payne, Beginning App Development with Flutter: Create Cross-Platform Mobile Apps, 1st edition, Apress.
3. Frank Zammetti, Practical Flutter: Improve your Mobile Development with Google's Latest Open-Source SDK, 1st edition, Apress

ESSENTIALS OF MACHINE LEARNING

B. Tech III Year II Semester – CSE-DS

L	T	P	C
3	1	0	4

Course Outcomes:

1. Understand the Concepts of Machine Learning
2. Develop Simple Regression Models
3. Build various classification algorithms
4. Analyze the need of ensemble learning and dimension reduction
5. Apply the Clustering algorithms for developing applications

Unit – I

Introduction to Machine Learning

What is Machine Learning, Types of Machine Learning, Applications of Machine learning, preparing to Model, Modelling and Evaluation

Unit – II

Supervised Learning: Regression

Introduction to Regression, Example of Regression, Simple Linear Regression, Multiple Linear Regression, Assumptions in Regression Analysis, Improving the accuracy of the Linear Regression Model, Ridge Regression, Lasso Regression.

Unit – III

Supervised Learning: Classification

What is Classification, General Approach to Classification, K-Nearest Neighbour Algorithm, Logistic Regression, Decision Trees: Construction, classification and regression trees, example, Naive Bayesian Classifier, Support Vector Machines: Optimal Separation, Kernels, Algorithm

Unit – IV

Unsupervised Learning and Dimensionality Reduction

Types of Unsupervised Learning, Challenges in Unsupervised Learning, Clustering Algorithms: K-Means, Agglomerative, DBSCAN, Comparing and Evaluating Clustering Algorithms. Dimensionality Reduction: Linear Discriminant Analysis (LDA), Principal Component Analysis (PCA), Factor Analysis (FA).

Unit – V

Ensemble Learning and Reinforcement Learning

Ensemble Methods: Bagging, Boosting & Random Forests, Reinforcement Learning: Overview, Example: Getting Lost, Markov Decision Process, Values, difference between SARSA and Q Learning, Uses of Reinforcement Learning

Text Books:

1. Machine Learning, Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, Pearson, 2018.
2. Machine Learning: An Algorithmic Perspective by Stephen Marsland, CRC Press, 2009

Reference Books:

1. Introduction to Machine Learning (Adaptive Computation and Machine Learning), Ethem Alpaydin, The MIT Press 2004.
2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition Aurélien Géron, 2019, O'Reilly Media, Inc.

BIG DATA ANALYTICS

B. Tech III Year II Semester – CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Explain the foundations, definitions, and challenges of Big Data.
2. Use Hadoop file system interfaces.
3. Program using HADOOP and Map reduce.
4. Understand various Hadoop Eco Systems like Pig, Hive.
5. Outline Hadoop Eco System using HBase, Zookeeper.

UNIT - I

Introduction to Big Data and Hadoop

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with UNIX tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System.

UNIT - II

HDFS (Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT - III

Map Reduce

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

UNIT - IV

Hadoop Eco System-I

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

UNIT - V

Hadoop Eco System-II

HBase: HBasics, Concepts, Clients, Example, Hbase versus RDBMS.

Zookeeper: The Zookeeper Services, Zookeeper in Production.

Text Books:

3. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reily Media, 2012.
4. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)

3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press.

PRINCIPLES OF PROGRAMMING LANGUAGES
(Professional Elective - II)

B. Tech III Year II Semester – CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Understand the importance of programming paradigms.
2. Illustrate the syntax and semantics in formal notation.
3. Make use of expressions and statements for subprograms and blocks.
4. Select different object-oriented concepts for solving a given problem.
5. Compare the features of different programming languages.

UNIT I

Preliminary Concepts:

Reasons for studying, concepts of programming languages, Programming domains, Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms Imperative, Object Oriented, functional Programming, Logic Programming. Programming Language Implementation Compilation and Virtual Machines, programming environments

UNIT II

Syntax and Semantics:

General Problem of describing Syntax and Semantics, formal methods of describing syntax - BNF, EBNF for common programming languages features, parse trees, ambiguous grammars, attribute grammars, denotation semantics and axiomatic semantics for common programming language features.

Names, Bindings, Data types:

Names, Variable, concept of binding, type checking, strong typing, type compatibility, named constants, variable initialization. Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types.

UNIT III

Expressions and Statements:

Arithmetic relational and Boolean expressions, Short circuit evaluation mixed mode assignment, Assignment Statements, Control Structures – Statement Level, Compound Statements, Selection, Iteration, Unconditional Statements and guarded commands.

UNIT IV

Subprograms and Blocks:

Fundamentals of sub-programs, Scope and life time of variables, static and dynamic scope, design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, parameters that are sub-program names, design issues for functions user defined overloaded operators, co routines.

Abstract Data types:

Abstractions and encapsulation, introductions to data abstraction, design issues, language examples, C++ parameterized ADT, object oriented programming in small talk, C++, Java, C#, Ada 95

UNIT V

Exception handling: Exceptions, exception Propagation, Exception handler in Ada, C++ and Java.

Logic Programming Language:

Introduction and overview of logic programming, basic elements of prolog, application of logic programming.

Text Books:

1. Concepts of Programming Languages Robert.W. Sebesta, Tenth Edition, Pearson Education.

Reference Books:

1. Programming Language Design Concepts, D. A. Watt, Wiley dreamtech, rp-2007.
2. Programming Languages, K. C. Loudon, 2nd Edition, Thomson, 2003.
3. LISP Patric Henry Winston and Paul Horn Pearson Education.

DISTRIBUTED DATABASES (PROFESSIONAL ELECTIVE-II)

L	T	P	C
3	0	0	3

B.Tech III Year II Semester CSE-DS

Course Outcomes:

At the end of the course student would be able to:

1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database systems.
3. Understand the design aspects of object-oriented database systems and related developments.

UNIT - I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT - II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query, optimization algorithms.

UNIT - III

Transaction Management: Definition, properties of transaction, types of transactions,

Distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT - IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT - V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, objectquery Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition.

INFORMATION SECURITY (Professional Elective-II)

L	T	P	C
3	0	0	3

B.Tech III Year II Semester

Course Outcomes:

1. Identify various Security Attacks.
2. Understand various Encryption Principles and algorithms.
3. Implement Cryptography algorithms.
4. Understand various Security Associations..
5. Inferring various Security Policies.

UNIT - I

Computer and Network Security Concepts

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Fundamental Security Design Principles, A Model for Network Security.

Classical Encryption Techniques

Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

UNIT - II

Block Ciphers and the Data Encryption Standard

Traditional Block Cipher Structure, The Data Encryption Standard, A DES Example, The Strength of DES, Block Cipher Design Principles.

Advanced Encryption Standard

AES Structure, AES Transformation Functions, AES Key Expansion, An AES Example.

UNIT - III

Block Cipher Operation

Multiple Encryption and Triple DES, Electronic Codebook, Cipher Block Chaining Mode, Cipher Feedback Mode, Output Feedback Mode, Counter Mode

Asymmetric Ciphers

Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Cryptography.

UNIT - IV

Data Integrity Algorithms

Applications of Cryptographic Hash Functions, Secure Hash Algorithm

Message Authentication Codes

Message Authentication Requirements, Message Authentication Functions, MACs Based on Hash Functions: HMAC, Digital Signatures, X.509 Certificates, Kerberos

UNIT - V

Electronic Mail Security, Internet Mail Architecture ,Email Formats , Email Threats and Comprehensive Email Security ,S/MIME, Pretty Good Privacy , HTTPS,

IP Security

IP Security Overview, IP Security Policy.

Text Book:

1. Cryptography and Networks Security (Principles and Practice) by William Stallings
Pearson Education, 7th Edition.

Reference Books:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)-2007
2. Network Security - Private Communication in a Public World by Charlie Kaufman,
Radia Perlman and Mike Speciner, 2nd Edition, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson.

CLOUD COMPUTING AND SECURITY
(Professional Elective-II)

B.Tech III Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of this course, the student would be able to:

1. Understand different Cloud Services
2. Recall and summarize migration and integration services into cloud
3. Analyze various enterprise applications in cloud computing
4. Understand and apply the virtualization concepts
5. Explain the basic threats and data security mechanism in cloud

UNIT - I

Introduction to cloud computing:

Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenge and Risks.

UNIT - II

Migration into a Cloud:

Introduction, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration in to a Cloud.

Enriching the 'Integration as a Service' Paradigm for the Cloud Era:

An Introduction, The Onset of Knowledge Era, The Evolution of SaaS, The challenges of SaaS Paradigm, new integration scenarios, the integration Methodologies, SaaS Integration Services.

UNIT - III

The Enterprise Cloud Computing Paradigm:

Introduction, Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers toward a Marketplace for Enterprise Cloud Computing, the Cloud Supply Chain

UNIT - IV

Virtual Machines Provisioning and Migration Services:

Background and Related Work, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, VM Provisioning and Migration in Action

Secure Distributed Data Storage in Cloud Computing:

Introduction, Cloud Storage: from LANs TO WANs, Technologies for Data Security in Cloud Computing

UNIT - V

Data Security in the Cloud:

An Introduction to the idea of Data Security, The Current State of Data Security in the Cloud, Homo Sapiens and Digital Information, Cloud Computing and Data Security Risk, Digital Identity and Data Security.

Text Book:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing Principles and Paradigms, Wiley Publications-2013

Reference Books:

1. Michael Miller, Cloud Computing Web-Based Application That Change the Way You Work and Collaborate Online, Pearson Publications-2008
2. Thomas Erl, Zaigham Mahmood, & Ricardo Puttini, Cloud Computing- Concepts, Technology & Architecture Pearson Publications-2013
3. Kai Hwang, Geoffrey C.Fox. Jack J. Dongarra, Distributed and Cloud Computing – From Parallel Processing to the Internet of Things, ELSEVIER Publications-First Edition.

BIG DATA ANALYTICS LAB

L	T	P	C
0	0	2	1

B.Tech III Year II Semester CSE-DS

Course Outcomes:

1. To introduce the tools required to manage and analyze big data like Hadoop, NoSql
2. To impart knowledge of map reduce paradigm to solve complex problems Map-Reduce
3. To introduce several new algorithms for big data mining like classification, clustering and finding frequent patterns

LIST OF EXPERIMENTS

Week 1, 2:

1. Implement the following Data structures in Java
 - a) Linked Lists
 - b) Stacks
 - c) Queues
 - d) Set
 - e) Map

Week 3

2. Perform setting up and Installing Hadoop in Pseudo distributed mode

Week 4:

3. Implement the following file management tasks in Hadoop:
 - i. Adding files and directories
 - ii. Retrieving files
 - iii. Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 5:

4. Run a basic Word Count Map Reduce program to understand Map-Reduce Paradigm.

Week 6:

5. Write a Map Reduce program that mines weather data.
Weather sensors collecting data every hour at many locations across the globe gather a Large volume of log data, which is a good candidate for analysis with Map-Reduce, since it is semi structured and record-oriented.

Week 7, 8:

6. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your Data.

Week 9, 10:

7. i) Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, Functions and indexes
ii) Performance techniques in Hive partitions, bucketing.

PREDICTIVE ANALYTICS

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. Understand the processing steps for predictive analytics
2. Construct and deploy prediction models with integrity
3. Explore various techniques (machine learning/data mining, ensemble) for predictive analytics.
4. Apply predictive analytics to real world examples.

UNIT - I

Introduction — types of analytics, applications of predictive analytics, overview of predictive analytics. Setting up the problem - processing steps, business understanding, objectives, data for predictive modeling, columns as measures, target variables, measures of success for predictive models.

UNIT - II

Prediction effect, deployment of prediction model, ethics and responsibilities The Data effect

UNIT - III

Machine Learning for prediction

Predictive modeling – decision trees, logistic regression, neural network, kNN, Bayesian method

Regression model

Assessing Predictive models - Batch Approach to Model Assessment, Percent Correct Classification, Rank-Ordered Approach to Model Assessment, Assessing Regression Models

UNIT - IV

Ensemble effect

Model ensembles — motivation, wisdom of crowds, Bagging, Boosting, Random forests, stochastic gradient boosting, heterogeneous ensembles.

UNIT - V

Case studies: Survey analysis, question answering— challenges in text mining, persuasion by the numbers

TEXT BOOKS:

1. Eric Siegel, Predictive analytics- the power to predict who will Click, buy, lie, or die, John Wiley & Sons, 2013.

2. Dean Abbott, Applied Predictive Analytics - Principles and Techniques for the Professional Data Analyst, 2014.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning-Data Mining, Inference, and Prediction, Second Edition, Springer Verlag, 2009.
2. G. James, D. Witten, T. Hastie, R. Tibshirani-An introduction to statistical learning with applications in R, Springer, 2013.
3. E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2010.

WEB AND SOCIAL MEDIA ANALYTICS

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

L	T	P	C
3	0	0	3

1. Knowledge on decision support systems
2. Apply natural language processing concepts on text analytics
3. Understand sentiment analysis
4. Knowledge on search engine optimization and web analytics

UNIT - I

An Overview of Business Intelligence, Analytics, and Decision Support

Analytics to Manage a Vaccine Supply Chain Effectively and Safely, Changing Business Environments and Computerized Decision Support, Information Systems Support for Decision Making, The Concept of Decision Support Systems (DSS), Business Analytics Overview, Brief Introduction to Big Data Analytics

UNIT - II

Text Analytics and Text Mining

Machine Versus Men on Jeopardy: The Story of Watson, Text Analytics and Text Mining Concepts and Definitions, Natural Language Processing, Text Mining Applications, Text Mining Process, Text Mining Tools

UNIT - III

Sentiment Analysis

Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis and Speech Analytics

UNIT - IV

Web Analytics, Web Mining

Security First Insurance Deepens Connection with Policyholders, Web Mining Overview, Web Content and Web Structure Mining, Search Engines, Search Engine Optimization, Web Usage Mining (Web Analytics), Web Analytics Maturity Model and Web Analytics Tools

UNIT - V

Social Analytics and Social Network Analysis

Social Analytics and Social Network Analysis, Social Media Definitions and Concepts, Social Media Analytics

Prescriptive Analytics - Optimization and Multi-Criteria Systems:

Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking

TEXT BOOK:

1. Ramesh Sharda, Dursun Delen, Efraim Turban, Business Intelligence and Analytics: Systems for Decision Support, Pearson Education

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra-Fernandez, "Business Intelligence—Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, ShakuAtre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

MOBILE APPLICATION DEVELOPMENT (Professional Elective-III)

B.Tech IV Year I Semester CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of this course, the student would be able to:

1. Understand the basics of Android devices and Platform.
2. Acquire knowledge on basic building blocks of Android programming required for App development.
3. Learn & Analyze about various Data Persistence schemes
4. Implement background services Multithreading Networking, Broadcast Receivers and Telephony Manager
5. Understand and Implement Location based services

UNIT I - Introduction to Mobile Applications & Android Studio

Introduction: Types of Mobile Applications, mobile application development, Android platform features and architecture, versions, comparison added features in each version, ART (Android Runtime), ADB (Android Debug Bridge).

Development environment/IDE: Android studio and its working environment, gradle build system, emulator setup.

Application anatomy: Application framework basics: resources, layout, values, asset XML representation and generated R.java file, Android manifest file, creating a simple application.

UNIT II - Android UI Design

GUI for Android: Introduction to activities, activities life-cycle

Intent: intent object, intent filters, linking activities.

Views and View Groups: Basic views, picker views, adapter views, Menu, App Bar etc, basics of screen design; different layouts, App widgets.

Material design: Card layouts. RecyclerView

Fragments: Introduction to activities, activities life-cycle.

UNIT III - Data Persistence

Different Data persistence schemes: Shared preferences, File Handling, Managing data using SQLite database

Content providers: User content provider, Android in build content providers.

UNIT IV - Back Ground Running Process, Networking and Telephony Services

Services: introduction to services local service, remote service and binding the service, the communication between service and activity, Intent Service.

Multithreading: Handlers, AsyncTask

Android network programming: HttpURLConnection, Connecting to REST-based and SOAP based Web services

Broad cast receivers: LocalBroadcastManager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications .

Telephony Manager: Sending SMS and making calls.

UNIT V - Location Based Services

Displaying Maps, Obtaining the Maps API Key, Displaying the zoom control, changing views, navigating to a specific location, Getting the location that was touched, Geocoding and Reverse Geocoding, Getting Location Data, Monitoring a Location

Text Books:

1. Professional Android 4 Application Development by Reto Meier
 2. Beginning Android Programming with Android Studio, 4th Edition , J. F. DiMarzio
- Published by. John Wiley & Sons, Inc., Indianapolis, Indiana

Reference Books:

1. Dawn Griffiths, David Griffiths, "Head First: Android Development", OReilly 2015, ISBN: 9781449362188

INTERNET OF THINGS (IoT)
(Professional Elective - III)

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

At the end of this course, the student would be able to:

1. Describe various IoT enabled technologies.
2. Understand the concepts of M2M with necessary protocols.
3. Illustrate Python programming for IoT
4. Examine the Python programming with Raspberry PI
5. Design web applications for IoT

UNIT I:

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT IoT Protocols, IoT communication models, IoT Communication APIs IoT enabled Technologies Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT II:

IoT and M2M Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG-NETCONF, YANG, SNMP NETOPPER.

UNIT III:

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT IV:

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V:

IoT Physical Servers and Cloud Offerings Introduction to Cloud Storage models and communication APIs. Web server Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.

Case study: Amazon web services for IoT.

TEXT BOOK:

1. Internet of Things a Hands-on Approach, ArshdeepBahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547.

REFERENCE BOOKS:

1. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, John Wiley and Sons, Ltd
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, kindle edition.

DEEP LEARNING
(Professional Elective - III)

B.Tech IV Year I Semester CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of this course, students will be able to:

1. Have a good understanding of the fundamental issues and basics of deep learning
2. Understand the concept of CNN to apply it in the Image classification problems
3. Learning and understanding the working of various RNN methods
4. Learning and understanding the working of various Autoencoders methods
5. Use Transfer Learning to solve problems with high dimensional data including image and speech

UNIT I

Deep Learning: Fundamentals, Introduction, Building Block of Neural Networks, Layers, MLPs, Forward pass, backward pass, class, trainer and optimizer, The Vanishing and Exploding Gradient Problems, Difficulties in Convergence, Local and Spurious Optima, Preprocessing, Momentum, learning rate Decay, Weight Initialization, Regularization, Dropout, SoftMax, Cross Entropy lossfunction, Activation Functions.

UNIT II

CNN: Introduction, striding and padding, pooling layers, structure, operations and prediction of CNN with layers, CNN -Case study with MNIST, CNN VS Fully Connected

UNIT III

RNN: Handling Branches, Layers, Nodes, Essential Elements-Vanilla RNNs, GRUs, LSTM

UNIT IV

Autoencoders: Denoising Autoencoders, Sparse Autoencoders, Deep Autoencoders, Variational Autoencoders, GANS

UNIT V

Transfer Learning- Types, Methodologies, Diving into Transfer Learning, Challenges

Text Books:

1. Seth Weidman, "Deep Learning from Scratch", O'Reilly Media, Inc., 2019
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2015

Reference Books:

1. Giancarlo Zaccone, Md. Rezaul Karim, Ahmed Menshawy "Deep Learning with TensorFlow: Explore neural networks with Python", Packt Publisher, 2017.
2. Antonio Gulli, Sujit Pal, "Deep Learning with Keras", Packt Publishers, 2017.
3. Francois Chollet, "Deep Learning with Python", Manning Publications, 2017.

FULL STACK DEVELOPMENT (Professional Elective - III)

B.Tech IV Year I Semester CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Design Front-End of the Full Stack Applications by using HTML and CSS.
2. Create dynamic web pages with the help of JavaScript and JQuery.
3. Design interactive User Interfaces with React JS and implement using Servlets
4. Implement Back-End programs using JSP and Spring framework.
5. Connect database with server-side applications using Hibernate.

UNIT - I

Building Blocks of Full Stack Development: Introduction, Front-End Technologies, Back-End Technologies, MVC, Web Services, Communication between Front-End and Back-End, JSON - Syntax, Parsing and Serialization.

HTML 5.0: Components of HTML, Text Formatting tags, Quotations, Links, Images, **CSS:** syntax, Box Model, CSS outline, Links in CSS, Responsiveness, Position Property, Navigation Bars, Dropdown, Forms.

UNIT - II

JavaScript: Introduction, variables, functions, Event handling, DOM, Form validation, **JQuery** - Syntax, Selectors, Events.

React: Introduction, Components - React Classes, Composing Components, passing data using Properties & Children, Dynamic Composition, React State - Initial State, Async State Initialization, Updating State, Event Handling, Stateless Components, Designing Components.

UNIT - III

More about React: React Router - Simple Routing, Route Parameters, Query Parameters, Links, Nested Routes, React Forms - Controlled Components, Filters, Typed Input, Edit Form, Number Input, Date Input, Text Input, Update API, Delete API.

Servlet: Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, Connecting to database.

UNIT - IV

JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, implicit objects, Java Bean, Connecting to database.

Spring Framework: Introduction, Architecture, MVC, Interception, Chain of Resolvers, View Resolution, Multiple View Pages, Multiple Controllers, Model Interface, RequestParam, Form Tag Library, Form Text Field, CRUD example, File Upload, Validations.

UNIT - V

Hibernate: Introduction, Architecture, Installation and Configuration, Java Objects, Inheritance Mapping, Collection Mapping, Mapping with Map, Hibernate Query Language, Caching, Spring Integration.

Web Services: Introduction, types of web services, Building RESTful Web Services with JAX-RS.

Text Books:

1. MAYURRAMGIR, FullStack Development with Spring MVC,Hibernate,jquery and BootStrap, WILEY Publications,2020.
2. Uttam K. Roy, Web Technologies, OXFORD University press, 2010.

References:

1. Matt Frisbie, Professional JavaScript for Web Developers, WILEY Publications, 2020.
2. Terry Ann Felke-Morris, Basics of Web Design, Pearson, Fifth Edition.
3. Alex Banks and Eve Porcello, Learning React, O'Reilly, 2017.

ADVANCED DATABASES
(Professional Elective - IV)

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. Understand the concepts of Distributed Database Systems.
2. Identify different Architectural Models for Distributed DBMS.
3. Characterize the query processors.
4. Design Algorithms for Concurrency control Mechanisms.
5. Identify different Parallel DBMS Techniques based on given constraints.

UNIT-I

Introduction

Distributed Data Processing, Distributed Database System, Promises of DDBSs, Design Issues.

UNIT-II

Distributed DBMS Architecture:

ANSI SPARC, Centralized DBMS Architecture, Architectural Models for Distributed DBMS.

Distributed Database Design:

Top-Down Design Process, Distribution Design issues, Fragmentation, Allocation.

UNIT-III

Introduction to RDBMS:

Overview of Relational DBMS: Relational Database Concepts, Normalization, Relational Data Languages.

Query Processing and Decomposition:

Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

UNIT-IV

Distributed Query Optimization:

Query optimization, centralized query optimization, Distributed query optimization algorithms.

Transaction Management:

Definition, properties of transaction; types of transactions.

UNIT-V

Distributed Concurrency Control:

Serializability theory, Concurrency control Mechanisms & Algorithms; Time stamped & Optimistic concurrency control algorithms, Deadlock Management, Relaxed Concurrency Control.

Text Books:

1. Principles of Distributed Database Systems, M.Tamer Ozsü, Patrick Valduriez, 3rd Edition, Springer.
2. Raghu Rama Kirshna, Johannes Gehrke, Database Management Systems|| Tata McGraw Hill 3rd Edition.

Reference Books:

1. Distributed Databases Stefano Ceri and Willipse Pelagatti, McGraw Hill.
2. M.Tamer OZSU and Pauck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
3. Henry F Korth, a Silberchatz and Sudershan: Database System Concepts. Tata MGH.

NATURAL LANGUAGE PROCESSING (Professional Elective - IV)

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Design, implement, and analyze NLP algorithms; and design different language modeling Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues

Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.



BLOCKCHAIN TECHNOLOGIES

(Professional Elective - IV)

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. Understand the Cryptography and Block Chain
2. Discuss about Generic elements of blockchain
3. Demonstrate various methods and routes of Decentralization
4. Analyze the concepts of Bitcoin
5. Apply Block chain in Real time scenario

Unit - I

Introduction to Cryptography and Blockchain:

Symmetric Cryptography, Stream Ciphers, Block Ciphers, Hash functions: Design of SHA-256, Merkle trees, Patricia trees, Distributed hash tables, Digital signatures. The Growth of Block Chain Technology: Electronic cash, Block Chain

Unit - II

Generic Elements of Blockchain, Blockchain working and Accumulation blocks, Benefits and Limitations of blockchain, Tiers of blockchain technology, Features of blockchain, Types of block chain, Consensus, CAP Theorem and block chain.

Unit - III

Decentralization:

Decentralization using block chain, Methods of Decentralization, Routes to Decentralization, Block chain and full Ecosystem Decentralization, Smart Contracts, Platforms for Decentralization.

Unit - IV

Introducing Bitcoin:

Digital keys and addresses, Transactions, Block Chain, Mining, The Bitcoin Network.

Unit - V

Ethereum blockchain, The Ethereum Network, Components of Ethereum Ecosystem. Current Landscape and what's next: Emerging trends, Blockchain Research.

Text Books:

1. Imran Bashir, Mastering Block chain, Packt Publishing, 2018.
2. VikramDhillon, David Metcalf, MaxHooper, BlockchainEnabledApplications, Apress, 2017.

Reference Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).



QUANTUM COMPUTING
(Professional Elective - IV)

L	T	P	C
3	0	0	3

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand The Impact of Quantum Computing on Cryptography

UNIT - I

History of Quantum Computing: Importance of Mathematics, Physics and Biology. Introduction to Quantum Computing: Bits Vs Qubits, Classical Vs Quantum logical operations

UNIT - II

Background Mathematics: Basics of Linear Algebra, Hilbert space, Probabilities and measurements. **Background Physics:** Paul's exclusion Principle, Superposition, Entanglement and super-symmetry, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis. **Background Biology:** Basic concepts of Genomics and Proteomics (Central Dogma)

UNIT - III

Qubit: Physical implementations of Qubit. Qubit as a quantum unit of information. The Bloch sphere **Quantum Circuits:** single qubit gates, multiple qubit gates, designing the quantum circuits. Bell states.

UNIT - IV

Quantum Algorithms: Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor's factorization algorithm, Grover's search algorithm.

UNIT - V

Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation. **Quantum Information and Cryptography:** Comparison between classical and quantum information theory. Quantum Cryptography, Quantum teleportation



TEXT BOOK:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge.

REFERENCE BOOKS:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II.
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

PREDICTIVE ANALYTICS LAB

B.Tech IV Year I Semester CSE-DS

Course outcomes:

L	T	P	C
0	0	2	1

1. Understand the processing steps for predictive analytics
2. Construct and deploy prediction models with integrity
3. Explore various techniques (machine learning/data mining, ensemble) for predictive analytics.
4. Apply predictive analytics to real world examples.

List of Experiments:

Following experiments to be carried out using Python/SPSS/SAS/R/Power BI

1. Simple Linear regression
2. Multiple Linear regression
3. Logistic Regression
4. CHAID
5. CART
6. ARIMA – stock market data
7. Exponential Smoothing
8. Hierarchical clustering
9. Ward's method of clustering
10. Crowdsourcing predictive analytics- Netflix data

TEXT BOOKS:

1. Eric Siegel, Predictive analytics- the power to predict who will Click, buy, lie, or die, John Wiley & Sons, 2013.
2. Dean Abbott, Applied Predictive Analytics - Principles and Techniques for the Professional Data Analyst, 2014.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning-Data Mining, Inference, and Prediction, Second Edition, Springer Verlag, 2009.
2. G. James, D. Witten, T. Hastie, R. Tibshirani-An introduction to statistical learning with applications in R, Springer, 2013
3. E. Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2010



MOBILE APPLICATION DEVELOPMENT LAB
(Professional Elective - III Lab)

B.Tech IV Year I Semester CSE-DS

Course outcomes:

L	T	P	C
0	0	2	1

1. Understand the working of Android OS Practically
2. Able to develop dynamic user interface applications
3. Able to Develop, Deploy and Maintain Android Applications

List of Experiments

1. Installation of Android Studio and Android Virtual Device Develop an android application to display “Hello World”
2. Develop an application that receives user’s name, contact and city and displays the same using Layout Managers and Event Listeners.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button
4. Create a native calculator application.
5. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
6. Develop a Registration and Login application that makes use of database.
7. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.
8. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
9. Create an alarm application using time picker to set alarm time.
10. Create an application that shows the given URL (from a text field) in a browser
11. Develop a native application that uses GPS location information.



INTERNET OF THINGS LAB
(Professional Elective - III Lab)

B.Tech IV Year I Semester CSE-DS

Course outcomes:

L	T	P	C
0	0	2	1

At the end of this course, the student would be able to:

1. Apply the concepts of IoT by identifying different related technologies.
2. Apply IoT to different applications by evaluating IoT protocols.
3. Design and develop smart IoT solutions by analyzing the data received from sensors.

List of Experiments

Week 1:

1. Introduction to Arduino Uno Sensors & Actuators
 - a. Temperature & Humidity Sensors
 - b. Air Quality Sensor
 - c. PIR Motion Sensor
 - d. Micro Servo Motor
 - e. Stepper Motor
 - f. 100RPM Motor

Week 2:

2. Introduction to Node MCU – Sensors & Actuators
 - a. Temperature & Humidity Sensors
 - b. Air Quality Sensor
 - c. PIR Motion Sensor
 - d. Micro Servo Motor
 - e. Stepper Motor
 - f. 100RPM Motor

Week 3:

3. Setting up your Raspberry Pi. Installation of software.
4. Introduction to Raspberry Pi – Sensors & Actuators
 - a. Temperature & Humidity Sensor
 - b. Ultrasonic Sensor
 - c. Micro Servo Motor

Week 4:

5. Introduction to IoT & Sensor control with IFTTT.



Week 5:

6. Build a Web-App: Blinking an LED over Internet.
7. Build a Web-App: Control a motor over Internet when motion is detected.

Week 6:

8. Live Temperature and Humidity monitoring over Internet.

Week 7:

9. Introduction to Open Source Cloud Platforms for IoT: OpenIoT, ThingSpeak.

Week 8:

10. Open Source Cloud Platforms for IoT: thinger.io, Google Cloud Platform.

Week 9 & 10:

11. Introduction to Open Web Services for IoT
12. Experiments with Open Web Services for IoT:
 - a. M2M Labs
 - b. The Thing Box
 - c. The Thing System
 - d. Node-RED

Week 11:

13. Home Automation System.

Week 12:

14. Build a Restful web service for IoT Management.

Week 13:

15. Build a web server for IoT Management



DEEP LEARNING LAB

(Professional Elective - III Lab)

B.Tech IV Year I Semester CSE-DS

L	T	P	C
0	0	2	1

Course Outcomes:

Upon the Successful Completion of the Course, the Students would be able to:

1. Learn The Fundamental Principles of Deep Learning.
2. Identify The Deep Learning Algorithms for Various Types of Learning Tasks in various domains.
3. Implement Deep Learning Algorithms and Solve Real-world problems.

List of Programs:

1. Implementation of Linear Regression
2. Deep learning Packages Basics: TensorFlow, Keras and PyTorch
3. Implementation of Neural network
4. Build your own CNN from scratch for face recognition and try to achieve the highest possible accuracy on any dataset
5. Sentiment Analysis using LSTM
6. Language Modeling using RNN
7. Sentiment Analysis using GRU
8. Image Classification with Transfer Learning
9. Case Study: Implement all deep learning pre-trained models (GoLeNet, VGGNet, AlexNet, ResNet, Xception) on any dataset and analyze the accuracy.

TEXT BOOKS:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.
2. The Elements of Statistical Learning. Hastie, R. Tibshirani, J. Friedman, Springer.
3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.
4. Géron, Aurélien. Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow: Concepts, tools, and techniques to build intelligent systems. O'Reilly Media, 2019.

REFERENCE BOOKS:

1. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G., H., and Van Loan, C., F., Matrix Computations, JHU Press, 2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Extensive Reading:

1. <http://www.deeplearning.net>
2. <https://www.deeplearningbook.org/>
3. <https://developers.google.com/machine-learning/crash-course/ml-intro>



FULL STACK DEVELOPMENT LAB
(Professional Elective - III Lab)

L	T	P	C
0	0	2	1

B.Tech IV Year I Semester CSE-DS

Course Outcomes:

1. To gain the knowledge of various Front-End technologies.
2. To Design Front-End of the full stack applications.
3. To understand and develop Back-End applications to connect to database.
4. To work with different case studies by using frameworks.

WEEK-1

1. a) Create a Web Page using HTML which contains a Heading, Image and 2 hyperlinks. Each hyperlink opens a new page in the same web browser. New page contains "Go Back" link that takes you to the main page.
b) Write a HTML program to create a Registration form, which contains User Name, Password, Date of Birth, Gender, Mail-id, Contact number, Address and submit button.

WEEK-2

2. a) Create a web page to demonstrate Position Property in CSS.
b) Create a Newspaper Style Design to print minimum 2 articles using HTML and CSS.

WEEK-3

3. a) Write a JavaScript program to change the background color after clicking "change color" button.
b) Write a JavaScript program to validate registration page using regular expression.

WEEK-4

4. a) Write a code to hide and show an element in a periodic interval without any action from the user using JQuery.
b) Write a program to create and Build a star rating system using JQuery.

WEEK-5

5. a) Write a program to demonstrate ReactJS Class and Instance.
b) Write a program to create a basic calculator to perform arithmetic operations using ReactJS.

WEEK-6

6. a) Demonstrate simple event handling example using ReactJS.
b) Write a program to create a simple voting application system using ReactJS.

WEEK-7

7. a) Create a webpage to display "Hello World" using SERVLET.
b) Implement a web application using SERVLET, which takes a name as input and on submitting it, shows a hello <name> page. It shows start time at the right top corner of



the page and provides a logout button. On clicking logout button, it should show a logout page with Thank You <name> message with the duration of usage (hint: Use session to store name and time).

WEEK-8

8. a) Write a JSP program to find a factorial of the given number.
b) Create a user validation web application using JSP, where the user submits the login name and password to the server. The name and password are checked against the data already available in database and if the data matches, a successful login page is returned. Otherwise show a failure message to the user.

WEEK-9

9. a) Demonstrate a simple example of Spring web MVC framework.
b) Illustrate how database is connected in Spring Framework by using simple CRUD application.

WEEK-10

10. a) create a simple example of hibernate application using eclipse IDE.
b) Create an application to demonstrate Hibernate Query Language.

WEEK-11 and 12

CASE STUDY-1: Create a Chat module/Interface using HTML CSS and JavaScript. The chat interface primarily consists of two segments: the message header and the chat box.

Message-Header- The message header resides at the top of the chat box. It includes the user's name, avatar or profile image, and the user's last seen. Last seen is the last time the user was active.

The Chat-Box- The chat box consists of the message page and the message bottom sections.

- Message page-The message page consists of incoming and outgoing messages, as well as the avatars of the senders. It also displays the time at which each message is sent.
- The Message-Bottom-This section contains an input field where the user can type in the messages and a send button to send them.

SEMANTIC WEB AND SOCIAL NETWORKS

B.Tech IV Year II Semester CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Identify the Structure of the Semantic Web Technology in reference with the World Wide Web.
2. Design the concepts of Resource Description Framework, Ontology and Web Ontology Language (OWL).
3. Understand Ontology Engineering Tools and Methods.
4. Apply Logic, Rule and Inference Engines in Semantic Applications.
5. Understand and Analyze Social Networks and design solution for Web based Social Networks like Blogs and Online Communities.

UNIT - I

Empowering the Information Age :

Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web.

Turing: What is Machine Intelligence? :

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents.

Berners-Lee: What is Solvable on the Web? :

Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT - II

Resource Description Framework:

HTML Language, XML Language, RDF Language, Basic Elements, RDF Schema.

Web Ontology Language:

Ontology Language, Ontology Language Requirements, Compatibility of OWL and RDF/RDFS, The OWL Language, Basic Elements, OWL Example: Compute Ontology, OWL Capabilities and Limitations.

UNIT - III

Ontology Engineering:

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

UNIT - IV

Logic, Rules, Inference & Semantic Web Applications:

Logic, Rule and Inference, Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

Semantic Search Technology:

Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods.

UNIT - V

Social Network Analysis:

What is Networks analysis, Development of the social networks analysis.

Electronic sources for network analysis:

Electronic Discussion networks. Blogs and Online Communities, Web Based Networks.

Developing social-semantic applications: Building Semantic Web Applications with social network features, Semantic Web Architecture.

Text Books:

1. Thinking on the Web Berners Lee, Godel and Turing, Wiley inter science, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

Reference Books:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, Audi Studer, Paul Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web Heiner Stucken schmidt; Frank Van Harmelen, Springer Publications.

E – COMMERCE

B. Tech IV Year II Semester – CSE-DS

L	T	P	C
3	0	0	3

Course Outcomes:

1. Identify the anatomy of E-Commerce applications and its process models.
2. Categorize different Electronic payment systems.
3. Examine Supply chain Management.
4. Analyze the various marketing strategies for an online business.
5. Design strategies for E-Commerce Catalogues.

UNIT-I

Electronic Commerce

Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications and E-Commerce organization applications, Consumer Oriented Electronic commerce, Mercantile Process models.

UNIT-II

Electronic Payment Systems

Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce EDI, EDI Implementation, Value added networks.

UNIT-III

Intra Organizational Commerce and work Flow, Automation, Customization, Internal Commerce, Supply chain Management.

UNIT-IV

Corporate Digital Library Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing Information based marketing, advertising on Internet, on-line marketing process, market research.

UNIT-V

Consumer Search and Resource Discovery

Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing.

Text Book:

1. Frontiers of electronic commerce Kalakata, Whinston, Pearson Education, 2004.

References Books:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.



DATA SCIENCE APPLICATIONS

B. Tech IV Year II Semester – CSE-DS

Course Outcomes:

1. Correlate data science and solutions to modern problems.
2. Decide when to use which type of technique in data science

L	T	P	C
3	0	0	3

UNIT - I

Data Science Applications in various domains, Challenges and opportunities, tools for data scientists Recommender systems – Introduction, methods, application, challenges.

UNIT - II

Time series data – stock market index movement forecasting. Supply Chain Management – Real world case study in logistics

UNIT - III

Data Science in Education, social media

UNIT - IV

Data Science in Healthcare, Bioinformatics

UNIT - V

Case studies in data optimization using Python.

TEXT BOOKS:

1. Aakanksha Sharaff, G.K. Sinha, “Data Science and its applications “, CRC Press, 2021.
2. Q.A. Menon, S.A. Khoja, “Data Science: Theory, Analysis and Applications”, CRC Press, 2020