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| **I YEAR I SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | BS | Mathematics-I | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | BS | Applied Chemistry | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | H&S | Communicative English | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | ESC | Computational Thinking and Programming | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | ESC | Elements of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | BS Lab | Applied Chemistry Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | ESC Lab | Computational Thinking and Programming Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | H &S Lab | English Communication Skills Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
|  | **Total Credits** | | | | | **19.5** | **195** | **455** |
|  | **Total Marks** | | | | | | **650** | |

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| **I YEAR II SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | BS | Mathematics –II | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | BS | Applied Physics | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | ESC | Digital Logic Design | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | ESC | Programming for Problem Solving | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | ESC | Computer Engineering Workshop | 1 | 0 | 4 | 3 | 15 | 35 |
| 6 | BS Lab | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | ESC Lab | Advanced Python Programming Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | ESC Lab | Programming for Problem Solving Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 9 | MC | Environmental Science | 2 | 0 | 0 | 0 | 0 | 0 |
|  | **Total Credits** | | | | | **19.5** | **180** | **420** |
|  | **Total Marks** | | | | | | **600** | |

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| **II YEAR I SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | BS / PC | Discrete Mathematical Structures | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | PC | Data Structures | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | PC | Database Management Systems | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | ESC | Object Oriented Programming thru Java | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | BS | Probability & Statistics | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | PC Lab | Data Structures Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | PC Lab | Database Management Systems Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | PC Lab | Object Oriented Programming thru Java Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 9 | SO | Skill Oriented Course – I   1. Animations – 2D Animation 2. Web Application Development Using Full Stack –Module - I | 0 | 0 | 4 | 2 | -- | 50 |
| 10 | MC | Constitution of India | 2 | 0 | 0 | 0 |  |  |
|  | **Total Credits** | | | | | **21.5** | **195** | **505** |
|  | **Total Marks** | | | | | | **700** | |

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| **II YEAR II SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | BS | Software Engineering | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | PC | Data warehousing and Mining | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | PC | Operating Systems | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | PC | Introduction to Artificial Intelligence & data Science | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | HS | Universal Human Values | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | PC Lab | Operating Systems Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | PC Lab | Artificial Intelligence & Data Science Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | PC Lab | Data Mining using Python Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 9 | SO | Skill Oriented Course – II   1. Animations – 3D Animation 2. Web Application Development Using Full Stack – Module - II | 0 | 0 | 4 | 2 | -- | 50 |
| 10 | MC | Critical Reading & Creative Writing | 2 | 0 | 0 | 0 |  |  |
|  | **Total Credits** | | | | | **21.5** | **195** | **505** |
|  | **Total Marks** | | | | | | **700** | |

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| **III YEAR I SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | PC | Design and Analysis of Algorithms | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | PC | Computer Organization | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | PC | Machine Learning | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | OE / JE | Web Technologies | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | PE | Compiler Design / Statistics with R Programming / Data Visualization /  Artificial Intelligence & Neural Networks | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | PC Lab | Web Technologies Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | PC Lab | Machine Learning Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | SAC/Soft Skill | Quantitative Aptitude & Logical Reasoning-I | 0 | 0 | 4 | 2 | -- | 50 |
| 9 | MC | Employability Skills - I | 2 | 0 | 0 | 0 |  |  |
| 10 | Summer Internship | | 0 | 0 | 0 | 1.5 |  |  |
|  | **Total Credits** | | | | | **21.5** | **195** | **505** |
| **Total Marks** | | | | | | | **700** | |

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| **III YEAR II SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | PC | Computer Networks | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | PC | Big Data Analytics | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | PC | Deep Learning | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | PE | Natural Language Processing /  Distributed Systems /  Pattern Recognition /  Internet Of Things | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | OE / JE | NO SQL Database | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | PC Lab | Deep Learning Lab using TensorFlow | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 7 | PC Lab | Big Data Analytics LAB | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 8 | PC Lab | No SQL Database Lab | 0 | 0 | 3 | 1.5 | 15 | 35 |
| 9 | SAC/Soft Skill | Advanced English Communication Skills Lab | 0 | 0 | 4 | 2 | -- | 50 |
| 10 | MC | Employability Skills - II (Business Analytics using Tableau) | 2 | 0 | 0 | 0 |  |  |
|  | **Total Credits** | | | | | **21.5** | **195** | **505** |
| **Total Marks** | | | | | | | **700** | |

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| **IV YEAR I SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | PE | Computer vision/ Cloud Computing/ Social Network Analysis/ Speech and video processing | 3 | 0 | 0 | 3 | 30 | 70 |
| 2 | PE | Text Analytics/  Image Processing/  Expert Systems/  DevOps | 3 | 0 | 0 | 3 | 30 | 70 |
| 3 | PE | Software Project Management / Cryptography and Network Security / Mobile Applications Development /  Mobile Computing | 3 | 0 | 0 | 3 | 30 | 70 |
| 4 | OE / JE | Robotic Process Automation | 3 | 0 | 0 | 3 | 30 | 70 |
| 5 | OE | Open Electives offered by other departments | 3 | 0 | 0 | 3 | 30 | 70 |
| 6 | HS Elective | Management Science / Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 | 30 | 70 |
| 8 | Skill Advanced Course | Julia Programming | 0 | 0 | 4 | 2 | -- | 50 |
| 9 | PR | Internship | 0 | 0 | 0 | 3 |  | 100 |
|  | **Total Credits** | | | | | **23** | **180** | **570** |
|  | **Total Marks** | | | | | | **750** | |

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| **IV YEAR II SEMESTER** | | | | | | | | |
| **S.No** | **Category** | **Subjects** | **L** | **T** | **P** | **C** | **I** | **E** |
| 1 | Project | Major Project Work, Seminar, Internship | - | - | - | 12 |  |  |
|  | **Total Credits** | | | | | **12** |  |  |
|  | **Total Marks** | | | | | |  | |

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **0** | **-** | **3** |
| **Subject** | **DISCRETE MATHEMATICAL STRUCTURES** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**Course Objectives**:

* Check the validity of arguments by using basic connective and valid rules of inference.
* Observe various properties of sets and relations.
* Identify different graphs, isomorphism of graphs, paths, cycles and circuits.
* Identify different types of trees.
* To introduce recurrence relations.

**UNIT I:** Mathematical Logic:Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate calculus: Predicate Logic, Statement Functions, Variables and Quantifiers, Inference theory for predicate calculus.

**UNIT II:** Set Theory:Introduction, Operations on Binary Sets. Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

Functions:Bijective Functions, Composition of Functions.

**UNIT III: Graph Theory I:**

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs).

**UNIT IV: Graph Theory II:**

Planar Graphs, Euler’s Formula, Graph Colouring and Covering, Chromatic Number, (Problems and Theorems without proofs).

Trees, Directed trees, Binary Trees, Spanning Trees: Properties, Algorithms for Spanning trees and Minimum SpanningTrees.

**UNIT V: Recurrence Relations:** Generating Functions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations.

**TEXT BOOKS:**

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

**REFERENCE BOOKS:**

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.

3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

**Course Outcomes:**

1. Ability to apply mathematical logic to solve problems.
2. Understand sets, relations, functions and discrete structures
3. Apply graph theory concepts to modeling problems in Computer Science using graphs.
4. Apply graph theory concepts to modeling problems in Computer Science using trees.
5. Solve different recurrence relations.

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **0** | **-** | **3** |
| **Subject** | **DATA STRUCTURES** | | | | |
| **Branch** | **CSE, IT , AI & DS** | | | | |

**Course Objectives**:

* Understand and apply algorithm analysis for various searching and sorting techniques
* Understand the concept of linked lists and be use it in various applications
* Be able to use Stacks and Queues in various applications
* Understand the concept of Trees & Graphs and perform various operations on it
* Understand the concept of Hashing & different types of Hashing Techniques

**UNIT I:**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Searching and Sorting: Linear and binary search methods. Bubble sort, Insertion sort, Selection Sort, Radix Sort, Comparison of sorting methods.

**UNIT II:**

Data structures-Linear and nonlinear data structures, Linear List, Array representation, Linked representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circularLinked lists-insertion, deletion operations, Applications of Linked Lists – Polynomial Representation, Sparse Matrix Representation

**UNIT III:**

Stacks - Representation of Stacks using arrays and linked lists, Applications of stacks -Expression evaluation - Infix to Postfix Conversion, Evaluating Postfix Expressions, Reversing the list

Queues – Representation of Queues using arrays and linked lists, Applications of Queues, Circular queue, Double Ended Queue -insertion, and deletion.

**UNIT IV:**

Trees- Terminology, Properties of Binary trees, Binary tree representations, recursive and non-recursive binary tree traversals, Priority Queues, Heaps-Max Heap, Min Heap.

Search trees- Binary search tree, Operations of Binary Search Trees - insertion, deletion and search, balanced search trees, AVL trees - Definition, operations.

**UNIT V:**

Graphs- Introduction, Definition, Graph Representation, Elementary Graph Operations – Vertex Insertion, Vertex Deletion, Edge Insertion, Edge Deletion etc, Graph Traversals

Hashing: Definition, Hash table, Hash function, Collision, Collision Resolution Techniques-Chaining and Open Addressing.

**TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran
2. Data Structures, Using C, Second Edition, ReemaThareja, OXFORD Higher Education. .

**REFERENCE BOOKS:**

1. Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
2. Data structures and Algorithm Analysis using C, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI

**Course Outcomes**:

By the end of the course, the students should be able to:

* Use various searching and sorting techniques, and analyze the complexity of various algorithms
* Perform various operations on Linked Lists, and use them in various applications
* Perform various operations on Stacks and Queues, and use them in various applications
* Perform various operations on Trees and Graphs, and use them in various applications
* Understand different types of Hashing Techniques

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| **Year/Semester** | **II B. Tech / I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2021-22** | **3** | **0** | **0** | **3** |
| **Subject** | **Object Oriented Programming through Java** | | | | |
| **Branch** | **CSE, IT, AI & DS, CS & BS** | | | | |

## 

Course Objectives:

* To identify Java language components and how they work together in applications
* To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
* To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
* To understand how to design applications with threads in Java

**Unit – I:**

**Introduction to OOPS:** Introduction, Need of OOP, Principles of Object Oriented Languages, Procedural languages vs OOP, Applications of OOP, History of Java,JVM, Java Features, Programming Style, Command Line Arguments, Escape Sequence Comments

Data Types, Variables, Operators and Flow of Control: Variables, Primitive Data types, Constants, Identifiers-Naming Conventions, Keywords, Literals, Operators- Binary, Unary, Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and casting, Flow of Control- Branching, Conditional Loops.

**Unit – II:**

**Classes and Objects:** Class declaration and Modifiers, Class Members, Declaration of Class Object, Object Creation, Access control for Class Members, Defining methods, Overloaded methods, Recursive methods, Constructor, Constructor overloading, static keyword, this keyword.

**Inheritance:** Types of Inheritance, Deriving classes using Extends keyword, Method Overloading, Super keyword, Final keyword, Polymorphism- Abstract classes and methods-Overloading-Overriding-

final methods and classes

**Unit – III**

**Interface:** Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Static methods in interface, functional interfaces.

**Packages and Java Library:** Defining package, Importing packages and classes into programs, Path and class path, Access control, Java.lang package and its classes, wrapper classes, auto –boxing and auto-unboxing, Java util classes and interfaces.

**Unit – IV:**

Exception Handling: Introduction, Exception handling techniques- try…catch, throw, throws, finally block, User defined Exception, checked exception, unchecked exception, custom exception, nested try and catch blocks

Input/Output and String Handling: Files and streams- Byte stream,I/O stream, Character StreamFile Reader and Writer, charArrayReader and Writer, Class String, Methods for Extracting characters from strings, String Methods, String Buffer, Class String Buffer.

**Unit V:**

Mutli- Threading: Introduction, Need for Multiple threads, Mulithreaded Programming, Thread Class, Main thread, Creation of new thread, thread states, thread priority. Java Database Connectivity: Introduction, JDBC Architecture, Environment Setup, JDBC Database Connections, Resultset Interface, Creating JDBC Applications

**TEXT BOOKS:**

1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.

2) The complete Reference Java, 8th edition, Herbert Schildt, TMH

3) Cay S. Horstmann, Gary cornell, ―Core Java Volume –I Fundamentals, 9th Edition, Prentice Hall, 2013.

**REFERENCE BOOKS:**

1) Introduction to java programming, 7th edition by Y Daniel Liang, Pearson

2) Murach&#39;s Java Programming, Joel Murach

**E-Resources:**

1) https://nptel.ac.in/courses/106/105/106105191/

2) https://www.w3schools.com/java/java\_data\_types.asp

**Course Outcomes:**

1. Able to realize the concept of Object Oriented Programming &amp; Java Programming

Constructs

2. Able to describe the basic concepts of Java such as, classes, objects, packages,

Enumeration and various keywords

3. Develop applications using various types of Inheritance and Interfaces.

4. Able to handle exceptions and perform various input/output operations on strings and

files.

5. Write programs using multithreading and interface with databases from Java program.

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **0** | **0** | **3** | **1.5** |
| **Subject** | **DATA STRUCTURES LAB** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**Course Objectives:**

The objective of this lab is to demonstrate the different data structures implementation.

**List of Experiments:**

**Exercise -1** (Searching) a) Write a program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list. b) Write a program that uses both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

**Exercise -2** (Sorting-I) Write programs to implement various sorting techniques like Bubble sort, Selection sort, Insertion sort, Radix sort

**Exercise -3**(Singly Linked List) a) Write a program that uses functions to create a singly linked list b) Write a program that uses functions to perform insertion operation on a singly linked list c) Write a program that uses functions to perform deletion operation on a singly linked list d) Write a program to reverse elements of a single linked list.

**Exercise -4** (Stack) a) Write a program that implement stack (its operations) using arrays b) Write a program that implement stack (its operations) using Linked list c) Write a program that uses Stack operations to evaluate postfix expression

**Exercise -5**(Queue) a) Write a program that implements Queue (its operations) using arrays. b) Write a program that implement Queue (its operations) using linked lists

**Exercise -6** (Binary Tree) Write a recursive function for traversing a binary tree in preorder, inorder and postorder.

**Exercise -7** (Binary Search Tree) a) Write a program to Create a BST b) Write a program to insert a node into a BST. c) Write a program to delete a node from a BST.

**Exercise – 8** (Graphs) – Represent graphs using adjacency matrix and adjacency list

**Course Outcomes:**

* Use various searching and sorting algorithms.
* Use basic data structures such as arrays and linked list.
* Implement various data structures like stacks, queues, trees & graphs, and use them for various applications

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| **Year/Semester** | **II B. Tech/ I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **0** | **0** | **3** | **1.5** |
| **Subject** | **DATABASE MANAGEMENT SYSTEMS LAB** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**Course Objectives:**

The objective of this lab is to teach the students how to store and retrieve data from databases using query languages. In addition, the students should be able to enforce various integrity constraints on the database data.

**List of Experiments:**

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION,INTERSECT, Constraints.
3. Queries using Aggregate functions, GROUP BY, HAVING and Creation and Dropping of Views.
4. Queries using Conversion functions, String functions, Date Functions
5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –handling

ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL

1. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
2. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
3. Programs development using creation of procedures, passing parameters IN and OUT ofPROCEDURES.
4. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
5. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
6. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
7. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.

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| **Year/Semester** | **II B. Tech / I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **0** | **0** | **3** | **1.5** |
| **Subject** | **Object Oriented Programmingthrough Java Lab** | | | | |
| **Branch** | **CSE,IT, AI&DS, CS&BS** | | | | |

## Course Objectives:

* Practice Programming in the Java
* Gain knowledge of object oriented paradigm in the java programming language
* Learn use of java in a variety of technologies and on different platforms.

## Exercise - 1 (Basics)

## a) Write a JAVA program to display default value of all primitive data type of JAVA

## b) Write a java program that display the roots of a quadratic equation ax2 +bx=0. Calculate

## the discriminate D and basing on value of D, describe the nature of root.

## c) Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

## Exercise - 2 (Operations, Expressions, Control-flow, Strings)

## Write the programs using the concept of operators,nested loops, recursion, arrays, String and StringBufferclass.

## Exercise - 3 (Class, Objects)

## Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside the main method.

## Write a JAVA program to implement constructor.

## Exercise - 4 (Methods)

## a) Write a JAVA program to implement constructor overloading.

## b) Write a JAVA program implementing method overloading.

## Exercise - 5 (Inheritance)

## a) Write a JAVA program to implement Single Inheritance

## b) Write a JAVA program to implement multi-level Inheritance

## c) Write a java program for abstract class to find areas of different shapes

## d) Write a JAVA program give example for “super” keyword.

## e) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

## Exercise - 6 (Exception)

## a) Write a JAVA program that describes exception handling mechanism

## b) Write a JAVA program Illustrating Multiple catch clauses

## Exercise – 7 (Runtime Polymorphism)

## a) Write a JAVA program that implements Runtime polymorphism

## b) Write a Case study on run time polymorphism, inheritance that implements in above problem

## Exercise – 8 (User defined Exception)

## Write a JAVA program for creation of Illustrating throw

## Write a JAVA program for creation of Illustrating finally

## Write a JAVA program for creation of Java Built-in Exceptions

## Write a JAVA program for creation of User Defined Exception

## Exercise – 9 (Threads)

## Write a JAVA program that creates threads by extending Thread class .First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable)

## Write a program illustrating isAlive and join ()

## Write a Program illustrating Daemon Threads.

## Write a JAVA program Producer Consumer Problem

## Exercise – 10 (Packages)

## Write a JAVA program illustrate class path

## Write a case study on including in classpath in your os environment of your package.

## Write a JAVA program that import and use the defined your package in the previous Problem

## Exercise - 11 ( I/O & JDBC)

## Write a program that uses the I/O package for reading and writing a text file.

## Write a program that uses JDBC API for interacting with the database.

**Course Outcomes:**

* 1. Apply the basic features of JAVA such as Control statements, Arrays, Classes, Inheritance, Interface and Packages in solving a problem
  2. Apply appropriate IO stream and collection framework for solving real time problem
  3. Determine Class, Objects, Methods, Exception and Polymorphism.
  4. Illustrating Simple Inheritance, multi-level Inheritance , Exception handling mechanism.
  5. Construct Threads and Implement Packages.

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| **Year/Semester** | **II B. Tech / I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **0** | **0** | **4** | **2** |
| **Subject** | **ANIMATIONS – 2D ANIMATION** | | | | |
| **Branch** | **CSE, IT, AI&DS, CS&BS** | | | | |

**Course Objectives:**

This Course will enable students to learn various aspects of animation using a variety of 2-DSoftwareand to implement advance principles of traditional animation in Adobe animate to create highQualityanimation for production.

**Course Outcomes:**

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

* learn various tools of digital 2-D animation.
* understand the production pipeline to create 2-D animation.
* analyze special effects in animation to bring interest and awe in the scenes andbackgrounds.
* apply the tools to create 2D animation for films and videos.

**Perform Experiments related to the following concepts:**

**2D GRAPHIC DESIGN**

Adobe Photoshop:

1. Create your visiting card

2. Create Title for any forthcoming film

3. Digital Matte Paint

4. Convert Black and White to Color

5. Convert Day mode to Night mode

6. Design Image manipulation

7. Smooth skin and remove blemishes & scars

8. Create a 3D pop-out effect

9. Create Textures

10. Timeline Animation

**Adobe Illustrator:**

1. Advertisement

2. Digital Illustrations

3. Brochure

4. Packet Design(Toothpaste packet, Soap cover, any Food product)

5. Danglers for display

6. Menu cards

7. Calendar Design

8. Tracing image

9. Vehicle Design

## 10. Festival

## 

**Adobe Indesign:**

1. Magazine A4 Size

2. Newspaper layout design & advertisements – Fine arts

3. Special Supplement

4. Different categories of Books

5. Info-graphics

6. Caricatures

**Corel DRAW:**

1. Create a paper ad for advertising of any commercial agency

2. Package Design

3. Corporate ID

4. Exhibition Layout

5. Oblers

**2D ANIMATION**

1. Creating Web Banners in Adobe Flash

2. Creating a Logo Animation in Adobe Flash

3. Creating Frame by Frame animation

4. Draw Cartoon Animation using reference.

5. Create Lip Sink to Characters

6. Using filters & Special effects

7. Create a scene by using Mask layers animation

**E-Learning Lab:**

8. Student Application form

9. Video Controlling

10. Audio Controlling

11. Start Drag and Stop Drag Actions

12. Interactive Keyboard Controls using Flash Action Script.

13. Interactive Flash Game.

## 14. Creating Character Animation in After Effects

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| **Year/Semester** | **II B. Tech / I Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **0** | **0** | **4** | **2** |
| **Subject** | **Web Application Development using Full Stack**  **– Module 1** | | | | |
| **Branch** | **CSE,IT, AI&DS** | | | | |

## Course Objectives:

## The objective of this lab is to provide understanding about the core concepts of frontend programming for web application

## Course Outcomes:

## By the end of this lab the student is able to

## Analyze a web page and identify its elements and attributes.

## Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet

## Create web pages using HTML and Cascading Style Sheets.

* Participate in the active development of cross-browser applications through JavaScript

## Perform experiments related to the following concepts:

## A) HTML

## 1) Introduction to HTML

## 2) Browsers and HTML

## 3) Editor’s Offline and Online

## 4) Tags, Attribute and Elements

## 5) Doctype Element

## 6) Comments

## 7) Headings, Paragraphs, and Formatting Text

## 8) Lists and Links

## 9) Images and Tables

## B) CSS

## 1) Introduction CSS

## 2) Applying CSS to HTML

## 3) Selectors, Properties and Values

## 4) CSS Colors and Backgrounds

## 5) CSS Box Model

## 6) CSS Margins, Padding, and Borders

## 7) CSS Text and Font Properties

## 8) CSS General Topics

## C) Javascript

1) Introduction to JavaScript

2) Applying JavaScript (internal and external)

3) Understanding JS Syntax

4) Introduction to Document and Window Object

5) Variables and Operators

6) Data Types and Num Type Conversion

7) Math and String Manipulation

8) Objects and Arrays

9) Date and Time

10) Conditional Statements

11) Switch Case

12) Looping in JS

13) Functions

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **-** | **-** | **3** |
| **Subject** | **SOFTWARE ENGINEERING** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**Course Objectives:**

This course is designed to:

* Give exposure to phases of Software Development, common process models including Waterfall, and the Unified Process, and hands-on experience with elements of the agile process
* Give exposure to a variety of Software Engineering practices such as requirements analysis and specification, code analysis, code debugging, testing, traceability, and version control
* Give exposure to Software Design techniques

**UNIT I**

The Nature of Software, The Unique Nature of WebApps, Software Engineering, TheSoftware Process, Software Engineering Practice, Software Myths, How It All Starts. AGeneric Process Model, Process Assessment and Improvement, Prescriptive Process Models,Specialized Process Models, The Unified Process, Personal and Team Process Models,Process Technology.

**UNIT II**

Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), OtherAgile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**UNIT III**

Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for RequirementsModelling, Requirements Modeling for WebApps.

**UNIT IV**

Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, What Is it a Component?, Designing Class-Based Components, Conducting Component-LevelDesign, Component-Level Design for WebApps, Designing Traditional Components,Component-Based Development.

**UNIT V**

The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation, Elements of Software Qualtiy Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A StrategicApproach to Software Testing, Strategic Issues, Test Strategies for Conventional Software,Test Strategies for Object-Oriented Software, Test Strategies for WebApps, ValidationTesting, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing

**Text Books:**

1) Software Engineering a practitioner’s approach, Roger S. Pressman, Seventh Edition,

McGraw Hill Higher Education.

2) Software Engineering, Ian Sommerville, Ninth Edition, Pearson.

**Reference Books:**

1) Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.

2) Software Engineering, UgrasenSuman, Cengage.

**e-Resources:**

1. <https://nptel.ac.in/courses/106/105/106105182/>

**Course Outcomes:**

Students taking this subject will gain software engineering skills in the following areas:

1. Transform an Object-Oriented Design into high quality, executable code
2. Skills to design, implement, and execute test cases at the Unit and Integration level
3. Compare conventional and agile software methods

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **-** | **-** | **3** |
| **Subject** | **Data warehousing & Mining** | | | | |
| **Branch** | **AI & DS** | | | | |

**Course Objectives:**

● To understand and implement classical models and algorithms in data warehousing and data mining.

● To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.

● To assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

**Course Outcomes:**

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

● Summarize the architecture of data warehouse

● Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data.

● Construct a decision tree and resolve the problem of model overfitting

● Compare Apriori and FP-growth association rule mining algorithms for frequent itemset generation

● Apply suitable clustering algorithm for the given data set

**UNIT- I**

**Data Warehouse and OLAP Technology:** An Overview: Data Warehouse, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. (Han & Kamber)

**UNIT- II**

**Data Mining:** Introduction, Data Mining, Motivating challenges, The origins of Data Mining, Data Mining Tasks, Types of Data, Data Quality.

Data Preprocessing: Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature creation, Discretization and Binarization, Variable Transformation, Measures of Similarity and Dissimilarity. (Tan &Vipin)

**UNIT -III**

**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

**Model Overfitting:** Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. Bayes Theorem, Naïve Bayes Classifier (Tan &Vipin)

**UNIT -IV**

**Association Analysis:** Basic Concepts and Algorithms: Problem Definition, Frequent Item Set Generation, Apriori Principle, Apriori Algorithm, Rule Generation, Compact Representation of Frequent Itemsets, FPGrowth Algorithm. (Tan &Vipin)

**UNIT –V**

**Cluster Analysis:** Basic Concepts and Algorithms: Overview, What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Tan &Vipin)

**Text Books:**

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Fifth Impression, Pearson, 2015.

2. Data Mining concepts and Techniques, 3rd Edition, Jiawei Han, Michel Kamber, Elsevier, 2011

**Reference Books:**

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning, 2010

2. Data Mining : Introductory and Advanced topics : Dunham, First Edition, Pearson, 2020

3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH, 2008

4. Data Mining Techniques, Arun K Pujari, Universities Press, 2001

**Web Resources:**

1. NPTEL Online Course on Data Mining : https://onlinecourses.nptel.ac.in/noc18\_cs14/preview

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **-** | **-** | **3** |
| **Subject** | **OPERATING SYSTEMS** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**COURSE OBJECTIVES:**

* Study the basic concepts and functions of operating systems.
* Understand the structure and functions of the OS.
* Learn about Processes, Threads and Scheduling algorithms.
* Understand the principles of concurrency and Deadlocks.
* Learn various memory management schemes.
* Study I/O management and File systems.

**UNIT I:**

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

**UNIT-II:**

Process Management – Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter-process Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

**UNIT-III:**

Concurrency & Deadlocks: Process Synchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples. Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

**UNIT-IV:**

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation, Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

**UNIT-V:**

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, and file sharing.

**File System implementation**- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling.

System Protection: Goals of protection, Principles and Domain of protection.

**TEXT BOOK:**

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.

2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.

3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.

**REFERENCES:**

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.

2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education”, 1996.

3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.

**OUTCOMES:**

1. Describe basic concepts & services provided by Operating System (OS).
2. Understand process management & various CPU scheduling algorithms
3. Understand various issues in concurrent execution of processes & dealing deadlocks
4. Understand the how the Operating System managements the memory
5. Understand the file management & protection services offered by OS.

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **-** | **-** | **3** |
| **Subject** | **INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE** | | | | |
| **Branch** | **AI & DS** | | | | |

**Course Objectives:**

 To provide a strong foundation of fundamental concepts in Artificial Intelligence.

 To provide a basic exposition to the goals and methods of Artificial Intelligence.

 To provide fundamentals of Data Science

**Course Outcomes:**

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

 Enumerate the history and foundations of Artificial Intelligence

 Apply the basic principles of AI in problem solving

 Choose the appropriate representation of Knowledge

 Enumerate the fundamentals of data science and NumPy .

 Summarize and compute descriptive statistics using pandas.

**UNIT I**

**Introduction:** What Is AI?, The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art, Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

**UNIT II**

**Problem Solving:** Problem-Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Local Search Algorithms and Optimization Problems, Searching with Nondeterministic Actions.

**UNIT III**

**Knowledge Representation:** Knowledge-Based Agents, Logic, Propositional Logic: A Very Simple Logic, Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, The Internet Shopping World.

**UNIT IV**

**What is Data science?** Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process.

**NumPy Basics:** The NumPy ndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique.

**UNIT V**

**Getting Started with pandas:** Introduction to pandas, Library Architecture, Features, Applications, Data Structures, Series, DataFrame, Index Objects, Essential Functionality Reindexing, Dropping entries from an axis, Indexing, selection, and filtering),Sorting and ranking, Summarizing and Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data.

**Text Books:**

1) Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Prentice Hall

2) Wes McKinney, “Python for Data Analysis”,O’REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.

3) Rachel Schutt & O’neil, “Doing Data Science”, O’REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013.

**Reference Books:**

1) Saroj Kaushik, “Artificial Intelligence”, Cengage Learning India, 2011

2) Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill

3) David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010.

4) Trivedi, M.C., “A Classical Approach to Artifical Intelligence”, Khanna Publishing House, Delhi.

5) Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly Media, 2015

6) Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.

**Web Resources:**

1) https://nptel.ac.in/courses/106105077

2) https://nptel.ac.in/courses/106106126

3) https://aima.cs.berkeley.edu

4) https://ai.berkeley,edu/project\_overview.html

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **-** | **-** | **3** | **1.5** |
| **Subject** | **OPERATING SYSTEMS LAB** | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**List of Lab Experiments:**

1. Simulate the following CPU Scheduling Algorithms

(a) FCFS   (b) SJF    (c) Priority   (d) Round-Robin

2. Simulate the following

(a) Multiprogramming with a Fixed number of Tasks (MFT)

(b) Multiprogramming with a Variable number of Tasks (MVT)

3. Simulate Bankers Algorithm for DeadLock Avoidance.

4. Simulate the following Page Replacement Algorithms

(a) FIFO   (b) LRU   (c) LFU

5. Write a program to simulate the following contiguous memory allocation techniques

a) Worst-fit b) Best-fit c) First-fit

6. Simulate the following File Allocation Strategies

(a) Sequenced   (b) Indexed   (c) Linked

7. Simulate the following Disk Scheduling Algorithms

(a) FCFS   (b) SSTF   (c) SCAN

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| **Year/Semester** | **II B. Tech/II Sem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **3** | **0** | **0** | **3** |
| **Subject** | **Artificial Intelligence & Data Science Lab** | | | | |
| **Branch** | **AI&DS** | | | | |

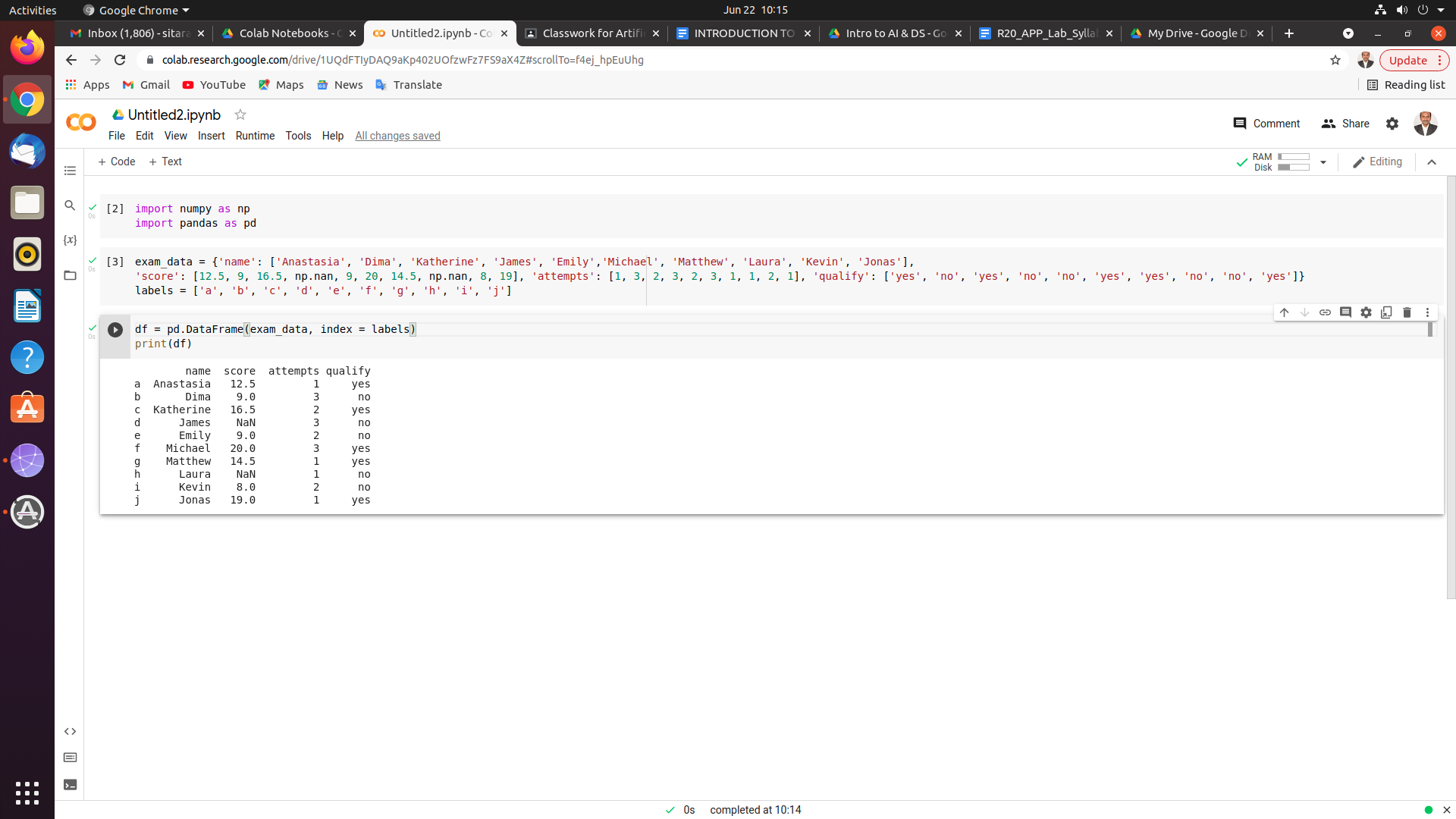
**Course objectives: To enable students**

* Explore basic workflow of learning from data.
* Apply various NumPy and pandas’ concepts to preprocess the data.
* Understand data visualization techniques and create reports
* Calculating simple descriptive statistical measures on datasets.
* Using sklearn to get inference from data.

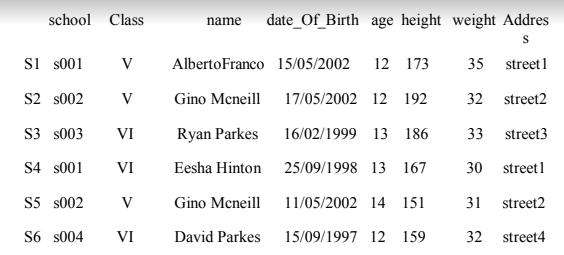
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**List of Experiments**

1. Creating a NumPy Array
   1. Basic ndarray
   2. Array of zeros
   3. Array of ones
   4. Random numbers in ndarray
   5. An array of your choice
   6. Identity matrix in NumPy
   7. Evenly spaced ndarray
2. The Shape and Reshaping of NumPy Array
   1. Dimensions of NumPy array
   2. Shape of NumPy array
   3. Size of NumPy array
   4. Reshaping a NumPy array
   5. Flattening a NumPy array
   6. Transpose of a NumPy array
3. Indexing and Slicing of NumPy Array
   1. Slicing 1-D NumPy arrays
   2. Slicing 2-D NumPy arrays
   3. Slicing 3-D NumPy arrays
   4. Negative slicing of NumPy arrays
4. Perform following operations using pandas
   1. Creating dataframe :
      1. Create a dataframe of ten rows, four columns with random values.
   2. concat() : Using concat() add a column at the beginning, column name is : S.No and values are integers starting from 1 to 10.
   3. Setting conditions: Write a Pandas program to print all the negative numbers.
   4. Adding a new column: Add a new column at the last, column name : Total, and values are sum of all the columns.



1. Create the dataframe (shown above):
   1. Write a Pandas program to create and display above DataFrame
      1. Using dictionary
      2. Using list of lists
   2. Write a Pandas program to change the name 'James' to 'Suresh' in the name column of the DataFrame.
   3. Write a Pandas program to insert a new column in existingDataFrame.
   4. Write a Pandas program to get a list from DataFrame column headers.
2. Read the following file formats using pandas (Open a notepad and create a dataframe separate values with comma and save it as data.csv, create another file and save it as data.txt, create one excel file)
   1. Read the text file as a dataframe in the pandas environment and print it.
   2. Read the csv file and print it.
   3. Read the excel file and print it.
   4. Read the text file where every value is delimited by “|”.
3. Perform following visualizations using matplotlib (Note that date\_of\_birth is a string in this dataframe)
   1. Create the dataframe as shown in the below image.
   2. Add some additional columns marks1, marks2, marks3 to the given dataframe.
   3. Write a Pandas program to create a horizontal bar plot using marks1, marks2, marks3 columns.
   4. Write a Pandas program to create a horizontal stacked bar plot using marks1, marks2, marks3 columns.



1. Using the same datagram (you created in 8)
   1. Add gender column to the dataframe [now the columns will be School, Class, name, date\_Of\_Birth, age, height, weight, address, marks1, marks2, marks3, gender)
   2. Find sum, mean, max, min values of columns age, height, weight, marks1, marks2, marks3.
   3. Find sum, mean, max, min values of columns age, height, weight, marks1, marks2, marks3 for girls and boys seperately.

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| **Year/Semester** | **II B. Tech/ IISem** | **L** | **T** | **P** | **C** |
| **Regulation Year** | **2020-21** | **-** | **-** | **3** | **1.5** |
| **Subject** | Skill Oriented Course: (Web Application Development using Full Stack Module - II) | | | | |
| **Branch** | **CSE, IT, AI & DS** | | | | |

**Advanced CSS & Responsive Web Design**

CSS Position, Rounded Corner, CSS Text Effects, CSS Gradients, Pagination, Shadows, CSS Flexbox, CSS Animation

Introduction to Responsive Web Design: Viewport, Introduction to Media Queries, Responsive Web Page Design using Media Queries, Introduction to CSS Grid, Layout, Elements, Grid Rows, Grid Columns, Grid Gaps, Grid Rows, Columns, Grid Template

**Advanced JavaScript & BootStrap**

Bootstrap: Bootstrap Introduction, Bootstrap Example, Bootstrap Container, Jumbotron, Buttons, Grid, Pagination, Images.

Javascript: The Basic of Javascript: Objects, Primitives Operations and Expressions,Object Creation and Modification, Arrays, Functions, Javascript ES6 Functions: Map, Filter.

**API, Application Programming Interface**

Introduction to API, What is API, Why we need API, API Types, API Endpoints, Paths and Parameters. API Authentication and Postman, JSON, Making GET Requests with the Node HTTPS Module Parse JSON, Using Express to Render a Website with Live API Data, Using Body Parser to Parse POST Requests to the Server, API Authentication and Types.

**NodeJS & Express:** Introduction to Express Framework, Introduction to Nodejs, What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling, API Handling, Debugging, Developing Template Engines, Using Process Managers, Security & Deployment

**Introduction to React JS:** Introducing JSX, Rendering Elements, DOM and Virtual DOM, Components and Props, State and Lifecycle, Handling Events, Conditional Rendering, Lists and Keys, Forms, Modals, Hooks.

**B.Tech III Year I Semester**

**Department of Artificial and Intelligence & Data Science**

**B.Tech III Year I Semester**

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| **III B.TECH I SEM** | **Design and Analysis of Algorithms** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* Induce the students with the fundamental concepts of various algorithm design techniques
* Make the students familiar to conduct performance evaluation of algorithms.
* Expertise the students with the various existing algorithm design techniques
* Motivate the students to design a new algorithm for various problems.
* Introduce the concepts of NP-Hard problems to the students.

**UNIT – I**

**INTRODUCTION** - Algorithm definition, Pseudo code Specifications, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations-Big-Oh, Omega, Theta, little-oh, Recurrences- Iteration Method, Master’s Method. Disjoint set Operations’ and algorithms-Find, Union

**DIVIDE AND CONQUER** - General Method, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick sort, Strassen’s Matrix Multiplication.

**UNIT - II**

**THE GREEDY METHOD** - General Method, Real Knapsack Problem, Job sequencing with deadlines, Minimum-cost spanning trees- Prim’s Algorithm and Kruskal’s algorithm, Optimal storage on tapes, Optimal merge pattern, Single source shortest Path

**UNIT - III**

**DYNAMIC PROGRAMMING** - General method, All pairs shortest path, Matrix chain Multiplication, Optimal Binary search trees, 0/1 Knapsack, the traveling salesman problem, Reliability design, String Editing

**UNIT – IV**

**GRAPHS –** Breadth first search, depth first search, connected and biconnected components, articulation points.

**BACKTRACKING –** The General Method, The n-Queens Problem, Sum of subsets, Graphs coloring, Hamiltonaian cycles, Knapsack Problem

**UNIT - V**

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

**NP-HARD AND NP-COMPLETE PROBLEMS** - Basic concepts, Non-deterministic algorithms,NP-Hard and NP- Complete Classes, Cook’s Theorem

**Course Outcomes:**

Upon completion of the course the student will be able to:

* Make use of asymptotic notations, divide and conquer techniques to decompose complex problems into small and simple.
* Choose Greedy method to find feasible solutions to problems.
* Examine complex engineering problems in finding the optimal solution.
* Construct all possible solutions using backtracking methods.
* Inspect Branch and Bound techniques and NP complete problems significance in algorithms.

**TEXT BOOKS:**

1. Ellis Horowitz, Sartaj Sahni (2013), Fundamentals of Computer Algorithms, Galgotia Publications, India.

**REFERENCE BOOKS:**

1. T.H. Cormen, C.E.Leiserson, R.L.Rivest,and C.Stein, Introduction to Algorithms, 2nd Edition, PHI Pvt.Ltd. / Pearson Education.
2. R.C.T.Lee, S.S.Tseng, R.C.Changand T.Tsai, Introduction to Design and Analysis of Algorithms A strategic approach, McGraw-Hill, India.
3. Allen Weiss, Data structures and Algorithm Analysis in C++, 2nd Edition, Pearson Education.
4. Richard Johnson baugh and Marcus Schaefer, Algorithms, Pearson Education**.**
5. Thomos H Corman, Introduction To Algorithms, PHI Pvt.Ltd.

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| **III B.TECH I SEM** | **Computer Organization** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

Understand the architecture of a modern computer with its various processing units.

**UNIT - I:**

**Basic Structure Of Computers:** Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

**UNIT - II:**

**Machine Instruction and Programs:** Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types, Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equations. Component of Instructions: Logic Instructions, shift and Rotate Instructions, Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

**UNIT - III:**

**INPUT/OUTPUT ORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

**UNIT - IV:**

T**he MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, ReadOnly Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING Secondary Storage: Magnetic Hard Disks, Optical Disks

**UNIT - V:**

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control, Micro programmed Control: Microinstructions, Microprogram Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

**TEXT BOOKS:**

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.

2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

**REFERENCE BOOKS:**

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson

3. Fundamentals of Computer Organization and Design, - Sivarama Dandamudi Springer Int.

4. “Computer Organization and Design: The Hardware/Software Interface” by David A. Patterson and John L. Hennessy.

**Course Outcomes:**

1. Student can understand the architecture of modern computer
2. Understanding of different instruction types.
3. Students can calculate the effective address of an operand by addressing modes
4. They can understand how computers store positive and negative numbers.
5. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

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| **III B.TECH I SEM** | **Machine Learning** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

To enable the students

* Define ML and understand their relationship with data
* Understand different types of supervised learning and build various regression and classification models
* Understand basic math fundamentals of this domain and intuitively understand basic math fundamental behind each technique
* Understand performance metrics
* Explain the mechanism of unsupervised learning and practice various clustering techniques in Python.
* Comprehend text mining and its applications

**Unit – I**

**Introduction**

Motivation, Applications of Machine Learning - Well-Posed Learning Problems - Designing a Learning System - Issues in Machine Learning - Types of Machine Learning

**Supervised Learning - Regression Techniques**

Basic concepts and applications of Regression - Simple Linear & Multiple Regression - Gradient Descent - Evaluation Measures for Regression Techniques - overfitting - underfitting - Regularization - Train-test-split, k-fold cross validation - Hyperparameter tuning.

**Unit - II**

**Supervised Learning - Classification Techniques**

Basic concepts and applications of classification - Naïve Bayes Classification, Logistic Regression, K-Nearest Neighbors, Classification Trees, Support Vector Machines, Evaluation Measures for Classification Techniques.

**Unit - III**

**Unsupervised Learning**

Definition, K-Means, Hierarchical clustering techniques. Dimensionality reduction using PCA. Feature Engineering –selection, factor analysis.Time series modeling (time series data types, stationarity and ARIMA modeling)

**Unit - IV**

**Natural Language Processing / Text mining**

Introduction. Applications. Chatbots, virtual agents (Alexa, Google Assistant, Siri). Importance, Applications, NLP Subproblems. Components of Natural Language. Steps to get text data into workable format.Terms Frequency, Inverse Document Frequency, Bag of Words, ngram, One hot encoding. Notion of corpus. Intro to NLTK

**Unit - V**

**Neural Networks**

Biological Neurons and Biological Neural Networks, Perceptron Learning, Activation Functions, Multilayer Perceptron, Back-propagation Neural Networks, Convolution Neural Network.

**TEXT BOOKS:**

1. Tom Mitchell, Machine Learning, TMH
2. C. Bishop, Pattern Recognition and Machine Learning, Springer
3. Stuart J. Russell and Peter Norvig,Artificial Intelligence A Modern Approach

**REFERENCES:**

1. Build an AI Assistant with Wolfram Alpha and Wikipedia in Python.<https://medium.com/@salisuwy/build-an-ai-assistant-with-wolfram-alpha-and-wikipedia-in-python-d9bc8ac838fe2>
2. Joseph Howse, Prateek Joshi, Michael Beyeler -Opencv\_ Computer Vision Projects with Python-Packt Publishing (2016)
3. Curated Datasets on Kaggle https://www.kaggle.com/datasets4.AurélienGéron,Hands on Machine Learning with Scikit-Learn and TensorFlow [Concepts, Tools, and Techniques to Build Intelligent Systems], Published by O’Reilly Media,2017

**Course Outcomes (COs):**

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

1. Understand the importance of Machine Learning
2. Apply regression and classification techniques for machine learning examples.
3. Comprehend supervised and unsupervised machine learning techniques.
4. Apply the neural network and dimensionality reduction techniques for machine learning applications.
5. Design and implement machine learning algorithms to solve real-world application problems.

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| **III B.TECH I SEM** | **WEB TECHNOLOGIES** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

The course enables students to:

* Describes the fundamentals of concepts of web and xml schemes
* Acquire server side scripting language concepts using PHP and Nodejs
* Understand creation of databases using MongoDB and integration using PHP and Nodejs.
* Understands the basic knowledge of servlets and jsp in building dynamic web applications.

**Course Outcomes:**

The student will be able to:

1. Enumerate the Basic Concepts of Web, Markup Languages and XML Schemas.
2. Develop web applications using Scripting Languages
3. Make use of Node JS frameworks and connect to MongoDB
4. Implement java and server side servlets to develop web applications.
5. Build interactive web applications using JSP by applying MVC framework.

**UNIT I -**

**Introduction to Web**

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. HTML5 concepts, CSS3, Anatomy of web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

**UNIT II - PHP**

Introduction to PHP, Create and run PHP script, working with variables, constants, data types, operators, conditional statements, control statements, arrays, functions, cookies, session tracking, working with forms and mysql databases.

**UNIT III -**

**Node.js & MongoDB**

Node.js: Introduction to Node.js, Features of Node.js, Advantages, Node.js Process Model, Node.js Built-in Modules, Node.js HTTP Module, Node.js NPM, Node.js File System Module and Node.js Events.

MongoDB: Introduction to NoSQL, create and manage MongoDB, Migration of Data into MongoDB, MongoDB with PHP, MongoDB with Nodejs.

**UNIT IV –**

**Java Servlets**

Java Servlets: Introduction to Servlets: Lifecycle of a Servlet, The Servlet API, The javax.servlet Package, Reading Servlet parameters, and Reading Initialization parameters. javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies, Session Tracking, Security Issues.

**UNIT V –**

**Java Server Page**

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP scripting, declarations, expression tag, JSP directives, Implicit JSP Objects, JSP action elements, cookies and session tracking, connecting to mysql database in JSP and MVC in JSP.

**Text Books:**

1. Programming the World Wide Web - Robert W. Sebesta - 7th edition – Pearson, 2013.
2. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.
3. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill, July 2017.
4. Pro Mean Stack Development, 1st Edition, ELad Elrom, Apress O’Reilly, 2016.

**Reference Books:**

1. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech, 2009.
2. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning, 2003.
3. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
4. Core Servlets and Java Server Pages: Volume 1: Core Technologies by Marty Hall and Larry Brown Pearson, 2003.
5. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.

**Web / Other References:**

* Wikipedia.org (for information on various concepts related to WT)
* php.net (for documentation/help on PHP language)
* w3schools.com (for code examples of various concepts related to WT)
* tizag.com (tutorials on various languages and technologies)

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| **III B.TECH I SEM** | **PE1: Compiler Design** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

* Demonstrate a working understanding of the process of scanning through the identification of the tokens of a programming language, the construction of regular expressions to define tokens, the construction of finite state automata to recognize tokens, and the writing of a functioning scanner to automatically identify the tokens in a program.
* Examine the process of Top-Down parsing and Bottom-up parsing and constructing the efficient parser.
* Demonstrate a working understanding of the process of semantic analysis through the construction of semantic records based on parse trees.
* Explain machine independent and dependent optimization techniques.
* Understand different code generation schemes.

**UNIT – I**

**INTRODUCTION TO COMPILERS**: Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, , pass and phases of translation, bootstrapping, LEX

lexical analyzer generator.

**PARSING**: Parsing, role of parser, context free grammar, derivations, parse trees, ambiguity, elimination of left recursion, left factoring, eliminating ambiguity from dangling-else grammar, top- down parsing– backtracking, recursive-descent parsing, predictive parsers, LL(1) grammars.

**UNIT – II**

**BOTTOM-UP PARSING**: Definition of bottom-up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR and Look Ahead LR parsers, error recovery in parsing, parsing ambiguous grammars, YACC-automatic parser generator.

**UNIT – III**

**SYNTAX-DIRECTED TRANSLATION**: Syntax directed definition, construction of syntax trees, S- attributed and L-attributed definitions, translation schemes, emitting a translation.

**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, syntax directed translation into three-address code, translation of simple statements, Boolean expressions and flow-of-control statements.

**UNIT – IV**

**TYPE CHECKING:** Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators.

**RUN TIME ENVIRONMENTS:** Source language issues, Storage organization, storage-allocation strategies, access to nonlocal names, parameter passing, symbol tables, and language facilities for dynamic storage allocation.

**UNIT - V**

**CODE OPTIMIZATION**: Organization of code optimizer, basic blocks and flow graphs, optimization of basic blocks, the principal sources of optimization, the dag representation of basic block, global data flow analysis.

**CODE GENERATOR**: Machine dependent code generation, object code forms, the target machine, a simple code generator, register allocation and assignment, peephole optimization.

**TEXT BOOKS:**

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2011), Compilers–Principles, Techniques and Tools, Low price edition, Pearson Education.

**REFERENCE BOOKS:**

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition,Pearson Education.
2. Kenneth C. Louden, Thomson (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.
3. K.L.P Mishra and N. Chandrashekaran (2003), Theory of computer science- Automata Languages and computation, 2nd edition, PHI.
4. Andrew W. Appel (2004), Modern Compiler Implementation C, Cambridge University Press.

**Course Outcomes:**

Upon completion of this course, students will get the knowledge about:

1. Use finite automata to recognize the tokens by lexical analyzer.
2. Interpret various parsing techniques to construct syntax analyzer.
3. Interpret SDT for various transformations of programming language constructs.
4. Discuss various runtime environment and symbol table implementations.
5. Demonstrate the various code optimization techniques for improving efficiency of target code.

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| **III B.TECH I SEM** | **PE1: Statistics with R Programming** | **L** | **T** | **P** | **C** |
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**Course Outcomes:**

After taking the course, students will be able to

* Use R for statistical programming, computation, graphics, and modeling
* Write functions and use R in an efficient wa
* Fit some basic types of statistical models
* Use R in their own research
* Be able to expand their knowledge of R on their own.

**Syllabus**

**UNIT-I**

Introduction How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

**UNIT-II**

R Programming Structures - Control Statements, Loops, - Looping Over Non vector Sets, If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Example: A Binary Search Tree.

**UNIT-III**

Doing Math and Simulation in R - Math Function, Extended Example Calculating Probability Cumulative Sums and Products-Minima and Maxima-Calculus, Functions for Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product-Extended, Set Operation, Input/output, Accessing the Keyboard and Monitor, Reading and writer Files.

**UNIT-IV**

Graphics - Creating Graphs, The Workhorse of R Base Graphics, the plot() Function –

Customizing Graphs, Saving Graphs to Files.

Probability Distributions - Normal Distribution- Binomial Distribution- Poisson Distributions, Basic Statistics, Correlation and Covariance.

**UNIT-V**

Linear Models - Simple Linear Regression, Multiple Regression Generalized Linear Models, Logistic Regression, Poisson Regression- other Generalized Linear Models-Survival Analysis.

# TEXT BOOKS:

1. The Art of R Programming, A K Verma, Cengage Learning.
2. R for Everyone, Lander, Pearson
3. The Art of R Programming, Norman Matloff, No starch Press.

# REFERENCE BOOKS:

# R Cookbook, Paul Teetor, Oreilly.

# R in Action, Rob Kabacoff, Manning

# Course Outcomes:

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

1. List motivation for learning a programming language
2. Access online resources for R and import new function packages into the R workspace
3. Import, review, manipulate and summarize data-sets in R
4. Explore data-sets to create testable hypotheses and identify appropriate statistical tests
5. Perform appropriate statistical tests using R Create and edit visualizations with

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| **III B.TECH I SEM** | **PE1: Data Visualization** | **L** | **T** | **P** | **C** |
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# Course Objectives:

# To understand and analyze the data in different formats with quantitative and qualitative approaches.

# To apply different visualization techniques that projects effective and efficient representations using various Visualization tools

# To enable learners to develop knowledge and skills in current and emerging areas of data Visualization.

# To critically assess and evaluate business and technical strategies for data analytics.

# To develop project-management, critical-thinking, problem-solving and decision making skills.

# Unit 1: Introduction to Data Visualization:

# Basic Considerations – Visualization, Interaction and Computation, Five Ws of Interactive Visual Data Analysis, Enhancing the Data Analysis, Influencing factors, Process models (Book 1).

# Unit 2: Graphics Representations: (Book 2)

# Good Graphics: Content, Context and Construction, Presentation Graphics and Exploratory Graphics, Presentation (What to Whom, How and Why), Scientific Design Choices in Data Visualization, Higher-dimensional Displays and Special Structures.

# Static Graphics: Complete Plots, Customization, Extensibility and other Issues,

# Unit 3: Data Visualization through their Graph Representations: (Book 2)

# Introduction, Data and Graphs, Graph layout Techniques, Graph Drawing

# Unit 4: Visualization Methods and Techniques: (Book 1)

# Visual Encoding and Presentation, Multivariate Data Visualization, Visualization of Temporal Data, Visualization of Geo-spatial Data, Graph Visualization

# Interacting with Visualizations: Requirements for Efficient Interaction, Basic Operations for Interaction, Interactive Selection and attenuation, Navigating Zoomable Visualizations, Comparisons

# Unit 5: Automatic Analysis: (Book 1)

# Visual Representations, Focusing on Relevant Data, Abstracting Data, Grouping Similar Data Elements, Dimensionality Reduction;

# Visualization in Multi-Display Environments, Guiding the user and Progressive Visual Data Analysis

# TextBooks:

# Christian Tominski,Heidrun Schumann, Interactive Visual Data Analysis, CRC Press, 2020

# Chun-houh Chen, Wolfgang Hardle, Antony Unwin, Handbook of Data Visualization, Springer 2008.

# Reference Books:

# Nurul Haszeli Ahmad, Tableau for Beginner Data Analysis and Visualization 101 (2020)

# Hwang, Jaejin, Yoon, Youngjin, Data Analytics and Visualization in Quality Analysis using Tableau, CRC Press, 2022

# Stephen Few, Show me the Numbers – Designing the Tables and Graphs to Enlighten, Second Edition, Analytics Press, 2012

# Tony Fischetti, R Data Analysis and Visualization-Packt (2016)

# Jay Jacobs, Bob Rudis - Data-Driven SecurityAnalysis, Visualization and Dashboards-Wiley (2014)

# Alex Campbell, Data Visualization Guide Clear Introduction to Data Mining,Analysis, and Visualization, 2021

# Course Outcomes:

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| By the end of the course, the student will be able to: | |
| 1. | Discuss the basic foundations of visual data analysis and its influence factors |
| 2. | Discuss the basic concepts of graphics and its presentations, issues |
| 3. | Apply different data visualization techniques through graph representations |
| 4. | Apply multivariate data visualization and visualization of temporal, geo and spatial data |
| 5. | Discuss dimensionality reduction and automatic analysis |

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| **III B.TECH I SEM** | **PE1: Artificial Intelligence and Neural Networks** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

# Course Objectives:

* The main objective of this course is to provide the student with the basic understanding of neural networks fundamentals,
* Program the related algorithms and Design the required and related systems

**UNIT - I:** Introduction and ANN Structure, Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

**UNIT - II:** Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra, State-space concepts, Concepts of optimization, Error-correction learning. Memory- based learning, Hebbian learning. Competitive learning.

**UNIT - III:** Single layer perceptrons, Structure and learning of perceptrons, Pattern classifier, introduction and Bayes' classifiers, Perceptron as a pattern classifier, Perceptron convergence. Limitations of a perceptron.

**UNIT - IV:** Feed forward ANN, Structures of Multi-layer feed forward networks. Back propagation algorithm, Back propagation - training and convergence, Functional approximation with back propagation. Practical and design issues of back propagation learning.

**UNIT - V:** Radial Basis Function Networks, Pattern separability and interpolation, Regularization Theory Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

# TEXT BOOKS:

1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

# REFERENCE BOOKS:

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

# Course Outcomes:

1. Demonstrate ANN structure and activation Functions
2. Define foundations and learning mechanisms and state-space concepts
3. Identify structure and learning of perceptions
4. Explain Feed forward, multi-layer feed forward networks and Back propagation algorithms
5. Analyze Radial Basis Function Networks, Theor Regularization and RBF networks

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| **III B.TECH I SEM** | **Web Technologies Lab** | **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

**Course Objectives:**

To make the student familiar with:

1. Creation of static web pages with HTML & dynamic web pages with HTML, JavaScript & CSS, XML, PHP.
2. Design and develop various types of websites using various client side , server side components using Servlets and JSP
3. Design and develop 3 tier applications and various web components and Database accessing with JDBC Concepts

**Course Outcomes:**

The student will be able to:

**CO 1:** Develop web applications using Scripting Languages (PHP,Nodejs)

**CO 2:** Develop connect to MongoDB

**CO 3:** Implement java and server side servlets to develop web application.

**CO 4:** Develop interactive web applications using JSP by applying MVC framework.

1) Write an XML file which will display the Book information which includes the following:

A) Title of the book

B) Author Name

C) ISBN number

D) Publisher name

E) Edition

F) Price

Write a Document Type Definition (DTD) to validate the above XML file.

2) Write a PHP program that uses arrays and functions in PHP.

3) Write a PHP program to create a login form and validate users.

4) Write a PHP program to display all students in CSE using the mysql student table.

5) Create a PHP page for the login system using session.

6) Write a PHP program to connect to MongoDB.

7) Write a Nodejs program to read and write file system

8) Write a Nodejs program to connect the MongoDB

9) Write a servlet program which receives data from HTML forms and responds to it. Create one Servlet to retrieve “ServletContext Initialization Parameters “which you have given in the web.xml file.

10) Write a servlet program to authenticate four users using cookies.

11) Write a servlet that, on entry of a student roll no, displays the full details of that student's details (Using student table with roll no, Name, Address, date of birth, course fields).

12) Write a JSP program to register a student using the registration form using the student table.

13) Write a JSP program for authenticating a user by his password using login form.

14) Create table to store the details of book(book name, price, author, publisher) and

extract data from the table and display all books using JSP and JDBC.

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| **III B.TECH I SEM** | **Machine Learning Lab** | **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

**Course objectives:**

This course will enable students to

* Make use of Data sets in implementing the machine learning algorithms
* Implement the machine learning concepts and algorithms in any suitable language of choice.

Note: For every Machine Learning model students should calculate the performance metrics and calculate the predictions on the test set.

**List of Experiments:**

1. Build a simple linear regression model and perform predictions on the test dataset. Consider a company’s data, where there is the amount spent on different types of advertisements and its subsequent sales

2. Build a Multiple Linear Regression model on a dataset (eg: 50\_startups)

3. Cross validate the above two models

4. Design a naive Bayes classifier for a sample training data set stored as

a .CSV file. Compute the accuracy of the classifier, considering few test data sets

5. Build a Logistic Regression classifier by considering a suitable dataset.

6. Implement k-Nearest Neighbor algorithm to classify the iris data set. Print both

correct and wrong predictions.

7. Design a classifier using Support vector machine on a suitable dataset

8. Build a Decision Tree Classifier on a suitable dataset (eg. Pima Indians Diabetes

dataset)

9. Practice K-Means clustering by generating your own data using the make\_blobs

function from sklearn.datasets module.

10. Perform K-Means clustering on the hand-written digits dataset.

11. Time series modeling - Predict number of air passengers per month.

(Dataset :AirPassengers)

12. Create an N-gram language model by using Reuters corpus of the NLTK library

13. Write python implementations for the following activation functions

a. Sigmoid

b. Tanh

c. Relu

d. Softmax

14. Implement perceptron algorithm from scratch and test it on a sample dataset

(eg. breast cancer dataset from sklearn)

**Weblinks for Datasets:**

1. Company Dataset : https://www.kaggle.com/rahulrky/company-data

https://github.com/Kaushik-Varma/linear\_regression\_model\_python/blob/main/Company\_data.cs 2.

1. 50\_startups Dataset :Link to dataset : <https://www.kaggle.com/farhanmd29/50-startups>
2. Pima Indian Diabetes Dataset : <https://www.kaggle.com/uciml/pima-indians-diabetes-database>
3. Air Passengers :<https://www.kaggle.com/rakannimer/air-passengers>

**Course Outcomes:**

The students should be able to:

1. Understand the implementation procedures for the machine learning algorithms.
2. Design Java/Python programs for various Learning algorithms.
3. Apply appropriate data sets to the Machine Learning algorithms.
4. Identify and apply Machine Learning algorithms to solve real world problems.

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| **III B.TECH I SEM** | **QUANTITATIVE APTITUDE & LOGICAL REASONING** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

Enable the students to:

* Understand divisibility, concepts of LCM& HCF, profit or loss incurred in a transaction.
* Understand the concepts of SI & CI and difference between.
* Know the relation between time, speed &distance and combined work & wages paid for the work.
* Be familiar with family relations, the techniques of coding.
* Understand the logic in series, concepts of clocks, identifying day of date.

**UNIT –I:**

**Number Systems - Profit & Loss.**

Basic number systems, Divisibility Rules, LCM and HCF. Cost Price- Selling Price- Marked Price, Discount- Successive Discounts, Profit or Loss Percentage, False Weights- Dishonest Dealer.

**UNIT –II:**

**Simple & Compound Interest.**

Principal - Interest Rate - Tenure, Simple Interest - Formula - Sum, Compound Interest - Formula - Relation Between Simple & Compound Interest, loan - EMI, Investments - Shares.

**UNIT –III:**

**Time & Distance- Time & Work.**

Time - Distance - Speed - Relation, Conversion of Speed, Average Speed, Trains - Relative Speed - Same and Opposite – Platform, Races, Boats - Streams - Upstream and Downstream.

Work-Time-Efficiency, Combined Work - Partnership - Division of Wages, Chain Rule, Pipes and Cisterns - Inlet - Outlet.

**UNIT –IV:**

**Blood Relations, Coding & Decoding.**

Blood relations - family tree, first person narrating type - coded relation - puzzle relation, Coding and decoding - letter coding, number coding, symbol coding, substitution and mixed type.

**UNIT –V:**

**Series, Clocks & Calendars.**

Series - number, letter and word type, missing term, odd-man out

Angle between hands - correct or incorrect time, day of a date - repeated calendars.

**Text Books:**

1.Dr. R.S.Aggarwal, Quantitative Aptitude for Competitive Examinations,Sultan Chand Publications, 2017.

2.Dr. R.S. Aggarwal,A Modern Approach to Verbal & Non-Verbal Reasoning Sultan Chand Publications, 2018.

**References:**

1. Arun Sharma, How to Prepare for Quantitative Aptitude for the CAT, Tata McGrawHillPublishing Company, 2016.
2. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson India, 2016
3. B.S.Sijwali and InduSijwali, A New Approach to Reasoning Verbal & Non-Verbal, Arihant Publishers, 2016.
4. M.K. Pandey, Analytical Reasoning,Bsc Publishing Co. Pvt. Ltd 2009.

**Course Outcomes:**

After completing this course, the students will be able to adopt speed computation techniques and develop logical thinking which are essential for campus recruitment such as

1. Find least and greatest number divisible by given numbers and leaving some remainder(s), Identify the profit or loss incurred in a transaction and how cheating is possible by an unfair trader.
2. Able to calculate the simple and compound interest and the EMI repayment for a loan.
3. Evaluate the time taken by a train/car for crossing a static or a moving object and time taken by a person to a row a boat in a river, calculate the time required for individual or combined work, shares of amount for their work and time taken for a tank/cistern to get filled by inlets and outlet.
4. Identify the relation between given persons, Decode the given code pattern and code given word in terms of alphabet, numbers, symbols and mixed,
5. Identify missing terms in the pattern/series, find angle between hands at given time and vice-versa, find day of given date and vice-versa.

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| **III B.TECH I SEM** | **Employability Skills-1** | **L** | **T** | **P** | **C** |
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**Course Objectives :**

* The development and implementation of advanced algorithms, as well as the skills required for programming competitions.

**Course Outcomes:**

By the end of the course students will be able to

1. select appropriate algorithms for a given problem
2. integrate multiple algorithms for solving a complex problem
3. design new algorithms, and implement them in Python or Java.
4. learn skills required for participation in programming contests, which include evaluation of problem difficulty, solving problems in teams, and work under time pressure.

**UNIT I**

**Basics of Array, String, Greedy and Bit Manipulation:**

Sum of array elements, Reverse of an array, Maximum and minimum element of an array, counting frequencies of array elements, prefix sum, Kadane algorithm, Activity Selection problem, Sliding Window, Bit manipulation.

**UNIT II**

**Number Theory and Combinatorics:**

Prime Number, Sieve of Eratosthenes, Find all divisors of a natural number, Least prime factor of numbers upto N, All prime factors of a number, Prime factorization using Sieve, Sum of all factors of a number, GCD and LCM of two numbers, Euclidean algorithms.

**UNIT III**

**Searching, Sorting, Basic Data Structures:**

Linear Search, Binary Search, Merge Sort, Quick Sort, Stack, Queue, Deque, Priority Queue.

**UNIT IV**

**Trees and Graphs:**

Tree Traversals, BFS, DFS, Dijkstra's Shortest Path algorithm, Bell-man Ford Algorithm, Floyd's algorithm

**UNIT V**

**Recursion and Dynamic Programming:**

Recursion and problems, Backtracking, N-Queens Problem, Dynamic Programming, Minimum-Edit Distance Problem.

**Text Books :**

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press

**Reference Books:**

1. Competitive Programming in Python: 128 Algorithms to Develop your Coding Skills by by Christoph Dürr, Jill-Jênn Vie
2. Guide to Competitive Programming: Learning and Improving Algorithms Through Contests (Undergraduate Topics in Computer Science) by Antti Laaksonen.

**B.Tech III Year II Semester**

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| **III B.TECH II SEM** | **Computer Networks** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* An ability to understand the basic concept of data communications and computer networks (e.g., different network types, applications, protocols, OSI layered architecture model, packet switching)
* An ability to understand different models of networks.
* An ability to understand various transmission media and different types of networks.
* An ability to understand functions of each layer in a network model.

**UNIT - I**

**INTRODUCTION:** Network applications, network hardware, network software, reference models: OSI, TCP/IP, Comparison of OSI and TCP/IP reference models.

**THE PHYSICAL LAYER:** Theoretical basis for communication, guided transmission media, wireless transmission, mobile telephone system.

**UNIT - II**

**THE DATA LINK LAYER:** Design issues, Error detection and correction, Elementary data link protocols, Sliding window protocols, example data link protocols - HDLC, the data link layer in the internet.

**THE MEDIUM ACCESS SUBLAYER:** Channel allocations problem, multiple access protocols, Ethernet.

**UNIT - III**

**THE NETWORK LAYER:** Network layer design issues, Routing algorithms, Congestion control algorithms, Internet working, The Network layer in the internet (IPv4 and IPv6), Quality of Service.

**UNIT - IV**

**THE TRANSPORT LAYER:** Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

**UNIT-V**

**THE APPLICATION LAYER:** Domain Name System, Electronic Mail

**World Wide Web**: Architectural overview, Dynamic web document and HTTP.

**APPLICATION LAYER PROTOCOLS:** Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet**.**

**TEXT BOOKS:**

1. A.S. Tanenbaum, Computer Networks (2011), 5th edition, Pearson Education/ PHI. New Delhi, India.
2. Behrouz A. Forouzan (2006), Data communication and Networking, Tata McGraw-Hill, India.

**REFERENCE BOOKS:**

1. Michael A Gallo, Bill Hancock, (2001), Computer Communications and Networking Technologies, Thomson Fitz Gerald, Dennis (2009), Business Data Communications & Networking, 10th edition, John Willeysons, USA.
2. William Stallings (2006), Cryptography and network security, 4th edition, Pearson Education, India.

**Course Outcomes:**

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

1. Understand OSI and TCP/IP models and LAN Technologies.
2. Analyze MAC layer protocols and various control mechanisms to resolve data transmission problems.
3. Understand routing and congestion control algorithms
4. Explain the Transport Layer functionalities
5. Gain familiarity with common networking & Application Protocols.

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| **III B.TECH II SEM** | Big Data Analytics | **L** | **T** | **P** | **C** |
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**Course Objectives:**

1. To optimize business decisions and create competitive advantage with Big Data analytics
2. To learn to analyse the big data using intelligent techniques
3. To introduce programming tools PIG & HIVE in Hadoop ecosystem

**UNIT - I**

**Introduction to Big Data**: Classification of Digital Data, Characteristics of Data,Definition of Big Data, Challenges with Big Data, Definitional Traits of Big Data, Tra-ditional Business Intelligence (BI) versus Big Data, Coexistence of Big Data and DataWarehouse, Realms of Big Data, Big Data Analytics, Classification of Analytics, Chal-lenges of Big Data, Terminologies Used in Big Data Environments, Few Top AnalyticsTools.PDF to Word Converter

**UNIT - II**

**The Big Data Technology Landscape:** NoSQL (Not Only SQL), Types of NoSQLDatabases, SQL versus NoSQL, Introduction to Hadoop, RDBMS versus Hadoop, Dis-tributed Computing Challenges, Hadoop Overview, Hadoop Distributors, HDFS (Hadoop Distributed File System), Working with HDFS commands, Interacting with HadoopEcosystem.

**UNIT - III**

**Mapreduce Programming:** Processing Data with Hadoop,Mapper, Reducer, Com-biner, Partitioner, Searching, Sorting, Compression,Managing Resources and Applicationswith Hadoop YARN.

**UNIT - IV**

**Cassandra**: Features of Cassandra, CQL Data Types, Keyspaces, CRUD Operations,Collection Types, Table Operations. MONGODB: Features of MongoDB, RDBMS vsMongoDB, Data Types in MongoDB, MongoDB Query Language, CRUD operations,Count, Limit, Sort, and Skip.

**UNIT - V**

**PIG:** The Anatomy of Pig, Pig Philosophy, Pig Latin Overview, Data Types in Pig, Run-ning Pig, Execution Modes of Pig, Relational Operators, Eval Functions, Word Count Using Pig. HIVE: Introduction to Hive, Hive Architecture, Hive Data Types, Hive FileFormat, Hive Query Language (HQL): DDL, DML, Partitions, Pig versus Hive.

**TEXT BOOKS:**

1. Seema Acharya, Subhashini Chellappan. Big Data and Analytics, 2ndEdition, Wiley India Private Limited, New Delhi, 2019.

**REFERENCE BOOKS:**

1. Tom White. Hadoop - The Definitive Guide, 4thEdition, O’Reilly Publications, India,2015.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman. Big Data forDummies, John Wiley & Sons, Inc., 2013.

**Course Outcomes:**

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

1. Identify the fundamental concepts of big data analytics.
2. Select Hadoop environment and apply HDFS commands on file management tasks.
3. Utilize optimization techniques of MapReduce Programming to process massive amounts of data in parallel.
4. Make use of NoSQL databases like MangoDB and Cassandra to store log data to be pulled for analysis.
5. Identify appropriate modern tools like Pig and Hive for complex data flow and analysis.

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| **III B.TECH II SEM** | **Deep Learning** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

At the end of the course, the students will be expected to:

* Learn deep learning methods for working with sequential data,
* Learn deep recurrent and memory networks,
* Learn deep Turing machines,
* Apply such deep learning mechanisms to various learning problems.
* Know the open issues in deep learning, and have a grasp of the current research directions.

**UNIT I: Introduction:** Why deep learning**,** Various paradigms of learning problems, Perspectives, and Issues in the deep learning framework.

**Feed-forward neural network:** Biological Neurons and Biological Neural Networks, Perceptron learning,activation functions, Artificial Neural Networks, Learning XOR problem, and multi-layer perceptron.

**UNIT II: Deep Neural Network:** Loss function, optimization techniques - Gradient descent, RMSprop, backpropagation, training deep models, regularization - Early stopping, augmentation, dropout.

**UNIT III: Convolution Neural Network:** Convolution operation, Building Blocks of CNN, Pooling, Variants of basic convolution function, and building a CNN for image classification.

**UNIT IV: Recurrent and Recursive Networks:** Recurrent Neural Networks, Bidirectional RNNs, Deep recurrent neural networks, Long Short-Term Memory Networks, and building an RNN for text classification.

**UNIT V: Applications:** Object recognition, computer vision, natural language processing. **Introduction to Deep Learning Tools:**  Tensorflow, Torch.

**TEXT BOOKS:**

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016..
2. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 1st edition-2006.

**REFERENCE BOOKS:**

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, first edition-2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,3rd edition-2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 3rd edition-2004.

**Course Outcomes:**

1. Demonstrate the basic concepts, fundamental techniques and layers [L2]
2. Make use of the Algorithms associated with Deep learning and Deep Network architectures for Machine Learning. [L3]
3. Determine the deep learning algorithms which are more feasible for operations in various domains. [L4]
4. Implement deep learning models using Python libraries and train them with real- world datasets.

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| **III B.TECH II SEM** | **PE2: Natural Language Processing** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* This course introduces the fundamental concepts and techniques of natural   
  language processing (NLP).
* Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
* The course examines NLP models and algorithms using both the traditional   
  symbolic and the more recent statistical approaches.
* Enable students to be capable to describe the application based on natural   
  language processing and to show the points of syntactic, semantic and   
  pragmatic processing.

**UNIT - I:**

**Introduction:** What is Natural Language Processing (NLP), Origins of NLP, Language and Knowledge, The challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Some successful Early NLP Systems, Information Retrieval, **Language Modelling:** Introduction, Various Grammar-based Language Models, Statistical Language Model.

**UNIT - II:**

**Word Level Analysis:** Introduction, Regular Expressions, Finite State Automata, Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of-Speech Tagging, **Syntactic Analysis:** Introduction, Context- Free Grammar, Constituency, Parsing, Probabilistic Parsing, Indian Languages.

**UNIT - III:**

**Semantic Analysis and Pragmatics:** Introduction, Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation, **Discourse Processing:** Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure.

**UNIT - IV:**

**Natural Language Generation:** Introduction, Architectures of NLG Systems, Generation task and Representations, Applications of NLG,

**Machine Translation:** Introduction, Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Direct Machine Translation, Rule-based Machine Translation, Corpus-based Machine Translation, Semantic or Knowledge-based MT Systems, Translation involving Indian Languages.

**UNIT - V:**

**NLP Applications:** Introduction, Information Extraction, Automatic Text Summarization, Question-Answering System, **Lexical Resources:** Introduction, Word Net, Frame Net, Stemmers, Part-of-Speech Tagger, Research Corpora, Journals and Conferences in the Area.

## TEXT BOOKS:

## Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

## Daniel Jurafsky, James H. Martin―Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

## REFERENCE BOOKS:

## Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python, First Edition, OReilly Media, 2009.

## Breck Baldwin, ―Language processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.

## Richard M Reese, ―Natural Language Processing with Java, OReilly Media, 2015.

**Course Outcomes:**

1. Demonstrate a given text with basic Language features. \
2. Explain a rule based system to tackle morphology/syntax of a language.
3. To design an innovative application using NLP components. K6 To design a tag set to be used for statistical processing for real-time applications.
4. To compare and contrast the use of different statistical approaches for different types of NLP applications. K2

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| **III B.TECH II SEM** | **PE2: Distributed Systems** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* Describe the issues in the design of modern operating systems of both single and multiple processor systems.
* Provide hands-on experience in developing distributed protocols.
* Create an awareness of the major technical challenges in distributed systems design and implementation.
* Acquainted with the design principles of distributed operating systems
* The course gives a high ended view on synchronization in distributed systems.
* Understands the working of real time distributed systems.

**UNIT –I**

**INTRODUCTION TO DISTRIBUTED SYSTEMS**: What is a Distributed System? Hardware concepts, software concepts, design issues.

**UNIT –II**

Communication in Distributed Systems, Layered Protocols, ATM networks, The client –server model, remote procedure call, group communication.

**UNIT –III**

**SYNCHRONIZATION IN DISTRIBUTED SYSTEM**: Clock synchronization, mutual exclusion, election algorithms, atomic transactions, deadlocks in distributed systems.

**UNIT –IV**

**PROCESS AND PROCESSORS IN DISTRIBUTED SYSTEM**: Threads, system models, processors allocation, scheduling in distributed system, fault tolerance, real time distributed systems

**DISTRIBUTED FILE SYSTEMS:** Distributed file system design, distributed file system implementation, trends in distributed file system.

**UNIT –V**

**DISTRIBUTED SHARED MEMORY**: Introduction, what is Shared memory? Consistency models, page based distributed shared memory, shared variable distributed shared memory, object based distributed shared memory.

**TEXT BOOKS:**

1. Distributed Operating Systems (2007), Andrew S. Tanenbanm, Pearson Education, Inc.

**REFERENCE BOOKS:**

1. Advanced Concepts in Operating Systems, Makes Singhal and Niranjan G. Shivaratna.

**Course Outcomes:**

Upon completion of the course the student will be able to:

1. Analyze the issues of scheduling for user level processes/threads.
2. Understand the concepts of deadlock in operating systems and how they can be managed / avoided. Design and implement network computational techniques using distributed operating systems.
3. Classify the types of security problems faced by operating systems and how to minimize these problems.
4. Describe the organization and synchronization of distributed operating systems.
5. Apply the knowledge of communication in distributed systems and how it can be used in remote procedure calls, remote objects and message-oriented communication.

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| **III B.TECH II SEM** | **PE2: Pattern Recognition** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

# Course Objectives

* This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning.
* Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.

**UNIT - I**: Introduction: What is Pattern Recognition, Datasets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

**UNIT - II:** Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

**UNIT - III:** Hidden Markov Models: Markov Models for Classification, Hidden Markov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

**UNIT - IV:** Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

**UNIT - V:** Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets. An Application-HandWritten Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

# TEXT BOOK:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Springer Pub, 1st Ed.

# REFERENCE BOOKS:

1. Machine Learning - McGraw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice- Hall Pub.

# Course Outcomes:

1. Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
2. Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.

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| **III B.TECH II SEM** | **PE2: Internet of Things** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* To give a comprehensive view of the “Internet of Things”.
* To analyze enabling technologies to make it happen in Embedded Devices and communication protocols
* To make use of the fundamental building blocks of such systems (sensors, actuators, converters, processors, intra- and inter-communication networks and interfaces, hardware and software co- design and related implementation and testing environments and techniques) and their inter- relationships.

### UNIT-I :

**Introduction to IoT** : Introduction to IoT- Characteristics- Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs.

### UNIT-II:

**IoT Design and Wireless Communication Protocols** : IoT Design Methodology , IoT Components, IoT Design Methodology using home automation and Weather monitoring, Wireless Communication Protocols : 6LoWPAN, Zigbee, WIFI, Bluetooth and BLE, LPWANs, Cellular 4G,5G,RFID, Lifi, Widi.

### UNIT-III:

**8051 Microcontroller and IoT Development Boards** : Introduction to Microcontrollers, the 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, IoT Development Boards -NodeMCU, ESP8266, Arduino, Intel Galileo and Raspberry Pi.

**IoT Protocols** : MQTT, UDP, MQTT brokers, publish subscribe modes, HTTP, COAP,XMPP and gateway protocols, IEEE 802.15.4 protocols.

### UNIT-IV:

**Building IoT Applications with Raspberry Pi** : Building IoT with RASPBERRY PI- IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python, Introduction to NodeMCU, Arduino and working example.

### UNIT-V:

**IoT Platforms, Cloud and Big Data in IoT** : Introduction to Cloud computing : Cloud Computing, clouds types and their features, Open Source IoT Platforms, AWS cloud for IoT, ThingSpeak, Python Web Application Framework, Django, AWS web services for IoT, Challenges in IoT and future directions.

### TEXT BOOKS:

1. Internet of Things – A Hands-on approach, Arshdeep Bagha, Vijay Madisetti University Press, 2015
2. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
3. Enabling things to talk – Designing IoT solutions with the IoT Architecture Reference Model, Alessandro Bassi, Martin Bauer, Martin Fielder, Thorsten Kramp, Rob van Kranenburg, Sebastian Lange, Stefan Meissner, Springer

# Course Outcomes:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to the network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

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| **III B.TECH II SEM** | **No SQL Database** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* Understand the fundamentals of NoSQL Databases
* Understand various NoSQL databases and their uses.
* Perform various operations on NoSQL databases.

**UNIT-I**

Introduction, Overview and History of NoSQL Databases, SQL vs NOSQL, Advantages over RDBMS, Limitations, Different Types of NoSQL Databases, Attack of the Clusters, The Emergence of NoSQL. Aggregate Data Models; Aggregates, Example of Relations and

Aggregates, Consequences of Aggregate Orientation.

**UNIT-II**

**Distribution Models**: Single Server, Shading, Master-Slave Replication, Peer-to-Peer Replication, Combining Shading and Replication, The CAP Theorem.

**Key-Value Databases:** What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Suitable Use Cases, When Not to Use.

**UNIT-III**

**Column Oriented Databases:**

What Is a Column-Family Data Store, Cassandra Database: What is Cassandra, Cassandra Architecture, Cassandra Data types, Cassandra Query Language-CQL, Creating, Altering, Dropping a KeySpace, Cassandra CRUD Operations, Suitable Use Cases, and When Not to Use.

**UNIT-IV**

**Document Oriented Databases:**

What Is a Document Database, Document Database using MongoDB, MongoDB Data Types, JSON, JSON Syntax, Creating JSON Object, MongoDB Data Modelling, MongoDB CRUD Operations, MongoDB Collections: Creating CSV Files, Exploring dataset structures, Using MongoDB , Suitable Use Cases, and When Not to Use.

**UNIT-V**

**Graph Databases:**

What Is a Graph Database, Graph Database using Neo4j, Advantages of Neo4j, CQL Data Types, Neo4j CQL Operators, Create Nodes, Create Relationships, Index, Constraint, Select data with match, Import data from CSV, Drop an Index, Drop a Constraint, Deleting Nodes, Deleting Relationships. Suitable Use Cases, and When Not to Use.

**Course Outcomes:**

At the end of the Course the student will be able to

1: Discuss about Aggregate Data Models and NoSQL Databases

2: Explain about Master-Slave Replication, Peer-to-Peer replication and Key- Value Databases

3: Demonstrate the detailed architecture and performance tune of Document-oriented NoSQL databases.

4: Explain performance tune of Key-Value Pair NoSQL databases.

5: Apply NoSQL development tools on different types of NoSQL Databases.

**TEXT BOOKS:**

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications,1st Edition ,2019.

**WEB REFERENCES:**

1. <https://www.ibm.com/cloud/learn/nosql-databases>

2. <https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp>

3. <https://www.geeksforgeeks.org/introduction-to-nosql/>

**Reference Books:**

1. Dan Sullivan, "NoSQLFor Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN13:978-9332557338)

2. Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press, 2013. (ISBN-13: 978-9351192022)

3. Kristina Chodorow, "Mongodb: The Definitive Guide- Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publications, 2013. (ISBN-13: 978-9351102694)

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| **III B.TECH II SEM** | **Deep Learning using TensorFlow Lab** | **L** | **T** | **P** | **C** |
| **0** | **0** | **3** | **1.5** |

**Course Objectives:**

● Implement the various deep learning algorithms in Python.

● Learn to work with different deep learning frameworks like Keras, Tensor flow, PyTorch, Caffe etc.

**List of Exercises / Experiments**

1. Write an application to implement Perception.

2. Write an application to implement AND OR gates using Perception.

3. Write an application to implement a simple neural network

4. Write an application to implement a multi-layered neural network

5. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

6. Design feed forward neural network for solving regression typeProblems. (Example: Predicting car purchase amount from car sales datasets)

7. Basic image processing operations: Histogram equalization, thresholding, edge detection, data augmentation, morphological operations

8. Design Convolution Neural Network for Image classification (use CIFAR-10 dataset for image classification)

9. Study the effect of batch normalization and dropout in neural network classifier

10. Familiarization of image labelling tools for object detection, segmentation

11. Object detection with single-stage and two-stage detectors (Yolo)

12. Design Recurrent Neural Network with LSTM (Example: Stock price prediction)

13. Image Captioning with LSTMs

**Expected Outcome:**

Expert knowledge in solving real world problems using state-of-art deep learning techniques

**References:**

Francois Chollet, “Deep learning with Python” – Manning Publications.

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| **III B.TECH II SEM** | **BIG DATA ANALYTICS LAB** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

1. a) Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed

b) Use web based tools to monitor your Hadoop setup.

2. Implement the following file management tasks in Hadoop:

• Adding files and directories

• Retrieving files

• 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.

3. Run a basic Word Count MapReduce program to understand MapReduce Paradigm.

4. 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.

5. Use MapReduce to find the shortest path between two people in a social graph.

Hint: Use an adjacency list to model a graph, and for each node store the distance from the original node, as well as a back pointer to the original node. Use the mappers to propagate the distance to the original node, and the reducer

to restore the state of the graph. Iterate until the target node has been reached.

6. Implement Friends-of-friends algorithm in MapReduce.

Hint: Two MapReduce jobs are required to calculate the FoFs for each user in a social network .The first job calculates the common friends for each user, and the second job sorts the common friends by the number of connections to your friends.

7. Implement an iterative PageRank graph algorithm in MapReduce.

Hint: PageRank can be implemented by iterating a MapReduce job until the graph has converged. The mappers are responsible for propagating node PageRank values to their adjacent nodes, and the reducers are responsible for calculating new PageRank values for each node, and for recreating the original graph with the updated PageRank values.

8. Create a Bloom filter in MapReduce.

Hint: Write a MapReduce job to create and output a Bloom filter using the Hadoop built-in BloomFilter class. The mappers are responsible for creating intermediary Bloom filters, and the single reducer combines them together to output a combined Bloom filter.

9. Perform an efficient semi-join in MapReduce.

Hint: Perform a semi-join by having the mappers load a Bloom filter from the Distributed Cache, and then filter results from the actual MapReduce data source by performing membership queries against the Bloom filter to determine which data source records should be emitted to the reducers.

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

11. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

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| **III B.TECH II SEM** | **No SQL Database Lab** | **L** | **T** | **P** | **C** |
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**Exercise-1:**

1. Installation and setup of MongoDB client and server

**Exercise-2:**

1. Create a database and collection using the MongoDB environment. For example a document collection meant for analysing Restaurant records can have fields like restaurant\_id, restaurant\_name, customer\_name, locality, date, cuisine, grade, comments. etc.
2. Create a database using INSERT, UPDATE, UPSERTS, DELETE and INDEX.
3. Practice writing simple MongoDB queries such as displaying all the records, display selected records with conditions

**Exercise-3:**

1. Experiment with MongoDB comparison and logical query operators - $gt, $gte, $lt, $lte, $in, #nin, $ne, $and, $or, $not

**Exercise-4:**

1. Practice exercise on element, array based and evaluation query operators -$exists, $type, $mod, $regex

**Exercise-5:**

1. Exercise on MongoDB shell commands and user management

**Exercise-6:**

1. Installation and configuration of Cassandra. Find out two use cases where Cassandra is preferred over MongoDB

**Exercise-7:**

1. Create a database in Cassandra using – Create, Alter and Drop. Add records using Inset, Update, Delete and Truncate.

**Exercise-8:**

1. Exercise based on Cassandra Query Language i.e. selecting records, select records with specific conditions

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| **III B.TECH II SEM** | **Advanced English Communication Skills Lab** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

● To expose students to different contexts through right vocabulary

● To inculcate the habit of reading and understanding any text

● To enable students to acquire the ability of writing for business purposes

● To enable students to acquire interview skills and group discussion dynamics

**Course Outcomes:**

● Upon the completion of the course, the student will be able to:

● Choose vocabulary contextually.

● Comprehend, analyze and interpret the text in a definite time frame.

● Write resumes cohesively and coherently.

● Construct and elaborate on a given topic. and Comprehend and practice the dynamics of group discussion

● Comprehend the concept and process of the interview; answering through mock interviews.

**UNIT – I**

Selected High GRE Words, Idioms & Phrases – Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases, collocations. **(2 sessions)**

**UNIT – II**

Reading Comprehension – General Vs Local Comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning. **(2 sessions)**

**UNIT – III**

Writing Skills – Structure of Resume writing –– Short Report Writing (Business/Technical)- **(2 sessions)**

**UNIT – IV**

Presentation Skills -- Group Discussion – Dynamics of Group Discussion. **(4 sessions)**

**UNIT – V**

Interview Skills – Concept and process – pre-interview planning, opening strategies, answering strategies, interview through teleconference & video-conference and mock interviews. **(3 sessions)**

**Suggested Software:**

1. K-Van solutions Software with CD
2. Oxford advanced learner’s compass, 7th Edition.

**Suggested Reading:**

1. Technical Communication by Meenakshi Raman &amp; Sangeeta Sharma, Oxford University Press 2009.
2. Business and Professional Communication: Keys for Workplace Excellence. Kelly M.Quintanilla&amp; Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
3. English Vocabulary in Use Series, Cambridge University Press 2008.
4. Communication Skills by Leena Sen, PHI Learning Pvt. Ltd., New Delhi, 2009.
5. A Course Book of Advanced Communication Skills Lab published by University Press, Hyderabad.

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| **III B.TECH II SEM** | **Employability Skills - II (Business Analytics using Tableau)** | **L** | **T** | **P** | **C** |
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**Course Objectives**:

* This Business Analytics program will help you gain the knowledge you need to turn your organization’s data into a tactical asset to generate business value.
* Outlines the concept of data visualization that is needed to inform changes in business.
* To identify various visual analytics tools and components of tableau.
* Describe different types of charts used for data analysis.
* Gives insight on Functions and parameters that are used in Tableau.

**UNIT I:** Introduction to Tableau & Data Visualization:: Introduction to Tableau, Tableau Architecture, Tableau Server Architecture, VizQL, introduction to Tableau Prep, Tableau Prep Builder User Interface, Data Visualization, Business Intelligence tools. Tableau Desktop Installation.

**UNIT II:** Data Visualization using Tableau: Visualizations, Functions in Tableau, Join and Union, Sort, Set, Forecasting, Highlighting, Device designer.

**UNIT III:** Visual Perception: Overview of perception, Visual analysis, Visual Perception.

Components of Tableau: Tableau Product family, Connecting to data, Filters, Sets, Groups, Data types, Measures and Dimensions.

**UNIT IV:** Charts & Graph: Generated fields in Tableau, Used cases in generated fields, Building charts in tableau, Features of Tableau, Usecase: IPL.

**UNIT V:** Functions: Numbers, Strings, Type Conversions, Aggregate and Logical Functions.

Parameters: parameters in Tableau, creating a parameter, using parameter in calculation, parameter in control, using parameter in visualization.

**TEXT BOOKS:**

# 1. Business Analytics : An Application Focus 3.75 by Purba Halady Rao , PHI Learning

**REFERENCE BOOKS:**

1. Business Analytics: Data Analysis and Decision Making with MindTap, 7th Edition Paperback – 1 September 2022

2. Business Analytics | Third Edition| By Pearson Paperback – 29 January 2021 by  [James R. Evans](https://www.amazon.in/James-R-Evans/e/B000AQ46M2/ref=dp_byline_cont_book_1)

E- Content:- https://www.youtube.com/watch?v=aHaOIvR00So

**Course Outcomes:**

1. Able to get brief ideas on data visualization and tableau installation.
2. To learn visualization operations and functions.
3. To understand the importance of Visual Analytics , features and techniques used for Visualization.
4. Able to explore various charts..
5. To understand basic calculations such as Numeric, String Manipulation, Logical and Aggregate functions.

**B.Tech IV Year I Semester**

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| **IV B.TECH I SEM** | **PE III : COMPUTER VISION** | **L** | **T** | **P** | **C** |
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**OBJECTIVES:**

1: To review image processing techniques for computer vision.

2: To understand various features and recognition techniques

3: To learn about histogram and binary vision

4: Apply three-dimensional image analysis techniques

5: Study real world applications of computer vision algorithms

**UNIT I**

**INTRODUCTION**

Image Processing, Computer Vision ,What is Computer Vision - Low-level, Mid-level, High-level; Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

**UNIT II**

**FEATURE EXTRACTION AND FEATURE SEGMENTATION**

Feature Extraction -Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT. Image Segmentation -Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation.

**UNIT III**

**IMAGES, HISTOGRAMS, BINARY VISION**

Simple pinhole camera model – Sampling – Quantisation – Colour images – Noise – Smoothing – 1D and 3D histograms - Histogram/Image Equalisation - Histogram Comparison - Back-projection - k-means Clustering – Thresholding - Threshold Detection Methods - Variations on Thresholding - Mathematical Morphology – Connectivity.

**UNIT IV 3D VISION AND MOTION**

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion–spline-based motion- optical flow – layered motion.

**UNIT V APPLICATIONS**

Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing , Virtual Reality and Augmented Reality.

**COURSE OUTCOMES:**

1. Explain low level processing of image and transformation techniques applied to images.
2. Explain the feature extraction, segmentation and object recognition methods.
3. Apply Histogram transform for detection of geometric shapes like line, ellipse and objects.
4. Illustrate 3D vision process and motion estimation techniques.
5. Apply vision techniques to real time applications.

**TEXT BOOKS:**

1. D. A. Forsyth, J. Ponce, “Computer Vision: A Modern Approach”, Pearson Education,

2003.

2. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer Verlag London

Limited,2011.

**REFERENCES:**

1. B. K. P. Horn -Robot Vision, McGraw-Hill.

2. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge

University Press, 2012.

3. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer

Vision, Third Edition, Academic Press, 2012.

4. E. R. Davies, (2012), “Computer & Machine Vision”, Fourth Edition, Academic Press.

5. Concise Computer Vision: An Introduction into Theory and Algorithms, by Reinhard Klette,

2014

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| **IV B.TECH I SEM** | **PE III : Cloud Computing** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

* This course provides an insight into cloud computing
* Topics covered include- distributed system models, different cloud service models, service- oriented architectures, cloud programming and software environments, resource management.

**UNIT - I**

**Computing Paradigms:** High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

**UNIT - II**

**Cloud Computing Fundamentals**: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

**UNIT - III**

**Cloud Computing Architecture and Management:** Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

**UNIT - IV**

**Cloud Service Models:** Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

**UNIT V**

**Cloud Service Providers:** EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

**TEXT BOOK**:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

**REFERENCE BOOKS:**

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej
2. M. Goscinski, Wiley, 2011.
3. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
4. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O’Reilly, SPD, rp 2011.

**Course Outcomes:**

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers.

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| **IV B.TECH I SEM** | **PE III : Social Network Analysis** | **L** | **T** | **P** | **C** |
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**Course Objectives:**

* It introduces the concepts of social media
* It provides the mechanisms for social network analysis
* Includes the concepts that allow for better visualization and analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

**UNIT - I:**

Introduction: Social Media and Social Networks. Social Media: New Technologies of Collaboration.

Social Network Analysis: Measuring, Mapping, and Modeling collections of Connections.

**UNIT - II:**

NodeXL, Layout, Visual Design, and Labeling, Calculating and Visualizing Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

**UNIT - III:**

CASE STUDIES - I:

Email: The lifeblood of Modern Communication. Thread Networks: Mapping Message Boards and Email Lists. Twitter: Conversation, Entertainment and Information.

**UNIT - IV:**

CASE STUDIES - II: Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks

**UNIT-V:**

CASE STUDIES - III:

You Tube: Contrasting Patterns of Content Interaction, and Prominence. Wiki Networks: Connections of Creativity and Collaboration.

**TEXT BOOKS:**

1. Hansen, Derek, Ben Sheiderman, Marc Smith, Analyzing Social Media Networks with NodeXL: Insights from a Connected World, Morgan Kaufmann, 2011.
2. Avinash Kaushik, Web Analytics 2.0: The Art of Online Accountability, Sybex, 2009.

**REFERENCE BOOK:**

1. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1st Edition, MGH, 2011.

**Course Outcomes:**

1. Ability to construct social network maps easily
2. Gain skills in tracking the content flow through the social media
3. Use NodeXL to perform social network analysis

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| **IV B.TECH I SEM** | **PE III : Speech and Video Processing** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

Knowledge on speech and video processing techniques

**UNIT - I:**

**Speech processing concepts:** The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and nonlinear filter banks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

**UNIT - II:**

**Speech recognition:** Real and Complex Cepstrum, application of cepstral analysis to speech signal, feature extraction for speech, static and dynamic feature for speech recognition, robustness issues, discrimination in the feature space, feature selection, MFCC, LPCC, Distance measures, vector quantization models. Gaussian Mixture model, HMM.

**UNIT - III:**

**Basics of Video Processing:** Video formation, perception and representation: Principle of color video, video cameras, video display, pinhole model, CAHV model, Camera motion, Shape model, motion model, Scene model, two-dimensional motion models. Three-Dimensional Rigid Motion, Approximation of projective mapping.

**UNIT - IV:**

**Motion estimation Techniques**: Optical flow, motion representation, motion estimation criteria, optimization methods, pixel-based motion estimation, Block matching algorithm, gradient Based, Intensity matching, feature matching, frequency domain motion estimation, Depth from motion. Motion analysis applications: Video Summarization, video surveillance.

**UNIT - V:**

**Object tracking and segmentation:** 2D and 3D video tracking, blob tracking, kernel based counter tracking, feature matching, filtering Mosaicing, video segmentation, mean shift based, active shape model, video shot boundary detection. Interframe compression, Motion compensation

**TEXT BOOKS:**

1. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signal processing series.
2. Digital Video processing, A Murat Tekalp, Prentice Hall.
3. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
4. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang, Pearson Education.

**REFERENCE BOOKS:**

1. “Speech and Audio Signal Processing”, B.Gold and N. Morgan, Wiley.
2. “Digital image sequence processing, Compression, and analysis”, Todd R. Reed, CRC Press
3. “Handbook of Image and Video processing”, Al Bovik, Academic press, second Edition

**Course Outcomes:**

1. Describe the mechanisms of human speech production systems and methods for speech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristics and sensors.
4. Apply motion estimation and object tracking algorithms on video sequence.

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| **IV B.TECH I SEM** | **PE IV : TEXT ANALYTICS** | **L** | **T** | **P** | **C** |
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**COURSE OBJECTIVES:**

1: To understand the methods for keyword extraction from documents.

2: To learn clustering methods for grouping of documents.

3: To explore the methods for classification of documents and Emails.

4: To explore text visualization techniques and anomaly detection.

5: To learn about Events and trends in text streams

**UNIT I**

**TEXT EXTRACTION**

Introduction- Rapid automatic keyword extraction: candidate keywords, keyword scores, adjoining keywords, extracted keywords-Benchmark evaluation: precision and recall, efficiency, stoplist generation, Evaluation on new articles.

**UNIT II**

**DOCUMENT CLUSTERING**

Multilingual document clustering: Multilingual LSA, Tucker1 method, PARAFAC2 method, LSA with term alignments, LMSA, LMSA with term alignments; Constrained clustering with k-means type algorithms.

**UNIT III**

**CONTENT BASED CLASSIFICATION**

Classification algorithms for Document Classification, Content-based spam email classification,

Utilizing nonnegative matrix factorization for email classification problems.

**UNIT IV**

**ANOMALY AND TREND DETECTION**

**Text visualization techniques:** Visualization in text analysis, Tag clouds, tag clouds, authorship and change tracking, Data Exploration and the search for novel patterns, sentiment tracking, visual analytics and FutureLens, scenario discovery. adaptive threshold setting for novelty mining: Introduction, adaptive threshold for anomaly detection, Experimental study.

**UNIT V**

**TEXT STREAMS**

**Events and trends in text streams:** Introduction, Text streams, Feature extraction and data reduction, Event detection, Trend detection, Event and trend descriptions. Embedding semantics in LDA topic models: Introduction, vector space modeling, latent semantic analysis, probabilistic latent semantic analysis, Latent Dirichlet allocation, embedding external semantics from Wikipedia, data-driven semantic embedding.

**COURSE OUTCOMES:**

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

CO1: Design text extraction techniques

CO2: Devise clustering techniques for text mining

CO3: Design classification techniques for text mining

CO4: Apply visualization techniques and perform anomaly & trend detection

CO5: Perform Event operations in Text streams

**REFERENCES**

1. Michael W. Berry & Jacob Kogan,"Text Mining Applications and Theory", Wiley publications, 2010.

2. Aggarwal, Charu C., and ChengXiangZhai, eds., “Mining text data”, Springer Science &

Business Media, 2012.

3. Miner, Gary, et al., “Practical text mining and statistical analysis for non-structured text data

applications”, Academic Press, 2012.

4. Srivastava, Ashok N., and MehranSahami, “Text mining: Classification, clustering, and

applications”, Chapman and Hall/CRC, 2009.

5. Buitelaar, Paul, Philipp Cimiano, and Bernardo Magnini, eds., “Ontology learning from text:

methods, evaluation and applications”, Vol. 123. IOS press, 2005.

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| **IV B.TECH I SEM** | **PE IV : Expert Systems** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* Understand the basic techniques of artificial intelligence.
* Understand the Non-monotonic reasoning and statistical reasoning.

**UNIT - I**

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO\* algorithm – game trees, Min- max algorithms, game playing – Alpha-beta pruning.

**UNIT - II**

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

**UNIT - III**

Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.

**UNIT - IV**

Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.

**UNIT - V**

Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process.

Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.

**TEXT BOOKS:**

1. Elain Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill, New Delhi.
2. Waterman D.A., “A Guide to Expert Systems”, Addison Wesley Longman.

**REFERENCE BOOKS:**

1. Stuart Russel and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Prentice- Hall.
2. Patrick Henry Winston, “Artificial Intelligence”, Addison Wesley.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley.
5. Weiss S.M. and Kulikowski C.A., “A Practical Guide to Designing Expert Systems”, Rowman & Allanheld, New Jersey.

**Course Outcomes:**

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert system.
4. Understand various problems with an expert system.

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| **IV B.TECH I SEM** | **PE IV : Image Processing** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* The objectives of this course are to cover the basic theory and algorithms that are widely used in digital image processing.
* Expose students to current technologies and issues that are specific to image processing systems
* Develop hands-on experience in using computers to process images
* Familiarize with MATLAB Image Processing Toolbox
* Develop critical thinking about shortcomings of the state of the art in image processing.

**UNIT-I**

**FUNDAMENTALS OF IMAGE PROCESSING:**

Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, and image geometry.

**UNIT–II**

**IMAGE TRANSFORMS**:

Fourier transform, DFT, DFT-properties, FFT, WALSH transform, HADAMARD transform, DCT.

**UNIT–III**

**IMAGE ENHANCEMENT (SPATIAL Domain Methods):**

Histogram Processing - definition, equalization, matching, local enhancement, use of histogram statics for image enhancement, Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-mean, median, mode filters, sharpening spatial filtering.

**UNIT–IV**

**IMAGE ENHANCEMENT (FREQUENCY Domain Methods):**

Design of low pass, high pass, edge enhancement, smoothing filters in frequency domain. Butter worth filter ,sharpening frequency domain filters, homomorphic filters in frequency domain.

**UNIT–V**

**IMAGE SEGMENTATION:**

Detection of discontinuities, edge linking and boundary detection, thresholding, region-based segmentation, use of motion in segmentation.

**COLOR IMAGE PROCESSING:**

Fundamentals, models, pseudo color image, color transformation, Fundamentals of image compression, image compression models, and color image compression.

**Course Outcomes:**

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

1. Know and understand the basics and fundamentals of digital signal and image processing, such as digitization, sampling, quantization, and2D-transforms.
2. Operate on images using the processing techniques of smoothing, sharpening, enhancing, reconstructing geometrical alterations, filtering, restoration, segmentation, features extraction, compression, encoding and color/multichannel.
3. Manipulate images using the computer reading, writing, printing, and operating on them.
4. Apply and relate the basic imaging techniques to practical cases, such as, multimedia, video conferencing, pattern and object recognition.
5. Aware of the ethical and legal issues related to image processing, such as, copyright, security, privacy, pornography, electronic distribution, etc.

**TEXT BOOKS:**

* + 1. Rafael C. Gonzalez, Richard E. Woods (2008), Digital Image Processing, Low Price Edition, Pearson Education, New Delhi India.

**REFERENCE BOOKS:**

1. Rafael C.Gonzalez, RichardE. Woods, Digital Image Processing, Second Edition, Prentice Hall.
2. Fundamentals of digital image processing by Anil K. jain, Low Price Edition, Pearson Education.
3. ArthurR.Weeks(1996),FundamentalsofElectronicImageProcessing,PrenticeHallofIndia,NewDelhi.
4. Milan Sonka, Vaclav Hlavac, Roger Bolye(2008), Image Processing, Analysis and Machine vision, Thomson Publications, India

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| **IV B.TECH I SEM** | **PE IV : DEVOPs** | **L** | **T** | **P** | **C** |
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**Course Objective:**

* DevOps improves collaboration and productivity by automating infrastructure and workflows and continuously measuring applications performance

**UNIT-I**

**Introduction to Devops**: Introduction to SDLC, Agile Model. Introduction to Devops, DevOps Features, DevOps Architecture, DevOps Lifecycle, Understanding Workflow and principles, Introduction to DevOps tools, Build Automation, Delivery Automation, Understanding Code Quality, Automation of CI/CD.

**UNIT-II**

**Source Code Management (GIT):** What is Version Control and GIT, GIT Installation, GIT features. GIT workflow, Working with remote repository, GIT commands, GIT branching, GIT staging and collaboration. UNIT TESTING – CODE COVERAGE: jUnit, nUnit & Code Coverage with SonarQube, SonarQube – Code Quality Analysis.

**UNIT-III**

**Build Automation – Continuous Integration(CI):** Build Automation, What is CI , Why CI is Required ,CI tools, Introduction to Jenkins (With Architecture), jenkins workflow, jenkins master slave architecture, Jenkins Pipelines, PIPELINE BASICS – Jenkins Master, Node, Agent, and Executor, Freestyle Projects & Pipelines, Jenkins for Continuous Integration, Create and Manage Builds,User Management in Jenkins, Schedule Builds, Launch Builds on Slave Nodes.

**UNIT-IV**

**Continuous Delivery:** Importance of Continuous Delivery, CONTINUOUS DEPLOYMENT: CD Flow, Containerization with Docker: Introduction to Docker, Docker installation, Docker commands, Images & Containers, DockerFile, Running containers, Working with containers and publish to Docker Hub.

**UNIT-V**

**Configuration Management – ANSIBLE**: Introduction to Ansible, Ansible tasks, Roles, Jinja2 templating, Vaults, Deployments using Ansible. CONTAINERIZATION USING KUBERNETES(OPENSHIFT): Introduction to Kubernetes Namespace & Resources , CI/CD – On OCP, BC , DC & ConfigMaps, Deploying Apps on Openshift Container Pods.

**Course Outcomes (COs)**

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

1. Identify the DevOps Concepts and Tools for effective project management.

2. Utilize GIT to keep track of different versions of the source code.

3. Build and Automate Test using Jenkins.

4. Implement containerization with Docker.

5. Use ANSIBLE, Kubernetes for automation and deployment.

**Text Books:**

1. Joyner, Joseph., Devops for Beginners: Devops Software Development Method Guide for Software Developers and It Professionals, 1st Edition, Mihails Konoplovs, 2015.

2. Alisson Machado de Menezes., Hands-on DevOps with Linux, 1st Edition, BPB Publications, India, 2021.

**Reference Books:**

1. Gene Kim, Jez Humble, Patrick Debois, John Willis. The DevOps Handbook, 1st Edition , IT Revolution Press, 2016.

2. Verona, Joakim., Practical DevOps, 1st Edition, Packt Publishing, 2016.

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| **IV B.TECH I SEM** | **PE V : SOFTWARE PROJECT MANAGEMENT** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**CourseObjectives:**

1. Provide cost effective, flexible project management for the software project to meet current and future demands of a business.
2. Able Ability to incorporate organizational culture into business software to build employee and workplace morale, to achieve the concurrence among stakeholders at every stage in the life cycle and synchronize the stakeholders expectations by conducting the reviews.
3. Able to support configuration management and change management for a healthy project and define the roles and Responsibilities of the Management and Technical people.
4. Optimize and analyze the software project resources to improve software ROI by reducing the development cost and State methods to analyze, estimate risks at early stages to reduce reengineering cost.

**UNIT-I**

**Conventional Software Management:** The waterfall model, conventional software Management performance. **Evolution of Software Economics:** Software economics, pragmatic software cost estimation. **Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation,Achieving required quality, peer inspections.

**UNIT-II**

**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**Lifecyclephases:**Engineeringandproductionstages,inception,Elaboration,construction,transitionphases**.Artifactsoftheprocess:**Theartifactsets,Managementartifacts,Engineeringartifacts,programmaticartifacts.

**Model based software architectures:** A Management perspective and technical perspective.

**UNIT-III**

**Work Flows of the process:** Software process workflows, Iteration workflows.

**Checkpoints of the process:** Major milestones, Minor Milestones, Periodic status assessments.

**Iterative Process Planning:** work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**UNIT-IV**

**Project Organization And Responsibilities** Line-of-Business Organizations, Project Organizations, evolution of Organizations. **Process Automation:** Automation Building blocks,The Project Environment.

**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

**Tailoring the Process:** Process discriminates.

**UNIT-V**

**Future Software Project Management:** modern Project Profiles, Next generation Software economics, modern process transitions.

**Case Study:** The command Center Processing and Display system-Replacement (CCPDSR).

**Course Outcomes:**

Upon completion of the course the student will be able to:

1. Analyze the function of basic parameters to estimate and improve the software economics.
2. Apply principles of modern software management to predict the software success.
3. Evaluate iterative process planning to synchronize the process workflows of the project.
4. Implement a project to manage project schedule, expenses and resources with suitable project management tools.

**TEXT BOOKS:**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

**REFERENCE BOOKS:**

1. Software Project Management, Bob Hughes and Mike Cottere ll: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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| **IV B.TECH I SEM** | **PE V : CRYPTOGRAPHY AND NETWORK SECURITY** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objectives:**

* Understand various cryptographic algorithms.
* Understand the basic categories of threats to computers and networks
* Describe a public-key cryptosystem.
* Describe the enhancements made to IPv4 by IPSec
* Understand Intrusions and intrusion detection
* Discuss the fundamental ideas of public-key cryptography.
* Generate and distribute a PGP key pair and use the PGP package to send an encrypted Email message.
* Discuss Web security and Firewalls

# UNIT-I

**SecurityConcepts:** Introduction, The need for Security,Security Approaches,Principles Of Security,Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

**Cryptography Concepts and Techniques:** Introduction, plain text and ciphertext, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

# UNIT-II

**SymmetrickeyCiphers:** BlockCipherprinciples, DES, AES, Blowfish, RC5, IDEA, Block Cipher Operation, Streamciphers, RC4.

**AsymmetrickeyCiphers:** Principles of public key cryptosystems, RSAalgorithm, ElgamalCryptography,Diffie-HellmanKey Exchange, Knapsack Algorithm.

# UNIT-III

**CryptographicHashFunctions:** MessageAuthentication, SecureHashAlgorithm(SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

**Key Management and Distribution:** Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution Public Keys, Kerberos, X.509 Authentication Service, Public–Key Infrastructure

# UNIT-IV

**Transport-level Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

**WirelessNetworkSecurity:**Wireless Security, Mobile Device Security, IEEE802.11 Wireless LAN, IEEE802.11iWirelessLAN Security

# UNIT-V

**Email Security:** Pretty Good Privacy, S/MIME

**IPSecurity:** IP Security overview,IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange

**Case Studies on Cryptography and security:** Secure Multiparty Calculation,Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross Site Scripting Vulnerability.

**Course Outcomes:**

Upon completion of the course the student will be able to:

1. Analyze the different Security Attacks, Services, and Mechanisms work security models.
2. Apply classical encryption algorithms (Substitution and Transposition ciphers) and DES algorithms to encrypt plain text.
3. Distinguish the modern Cryptography algorithm such as DES,AES, double DES, Triple DES, RC4 algorithm and analyze modern cryptanalysis techniques.
4. Solve the problem on Number theory, public key cryptography techniques (RSA) and key management algorithms (Diffie-Hellman).
5. Compare and contrast message authentication algorithms (SHA-512, MAC, HMAC), symmetric and asymmetric encryption and authentication standards and protocols.
6. Examine the different network security protocols (IPSec, TLS/SSL, SET, S/MIME, PGP) and Firewall types and principles.

# TEXTBOOKS:

1. Cryptography and Network Security-Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security : AtulKahate, McGrawHill, 3rd Edition

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| **IV B.TECH I SEM** | **PE V : Mobile Application Development** | **L** | **T** | **P** | **C** |
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**Course objectives**

* With this course, students will be able to: Describethoseaspectsofmobileprogrammingthatmakeituniquefromprogramming for other platforms
* Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
* Program mobile applications for the Android operating system that use basic and advanced phone features
* Deploy applications to the Android marketplace for distribution

**UNIT-I**

A brief history of Mobile, Types of mobile phone generations, The Mobile Ecosystem, Types of Mobile Applications, Mobile Information Architecture

Android Versions, Features of Android, Android Architecture, Installing Android SDK Tools, Configuring Android in Eclipse IDE, Android Development Tools(ADT),Creating Android Virtual Devices(AVD)

**UNIT-II**

Creating first android application, Anatomy of android application, Deploying Android app on USB connected Android device, Android application components, Activity life cycle, Understanding activities ,Exploring Intent objects, Intent Types, Linking activities using intents

**UNIT-III**

Fragments life cycle, Interaction between fragments, Understanding the components of a screen (Layouts),Adapting to display orientation, Managing changes to screen orientation, Utilizing the Action Bar, Working with Views(UI Widgets)-Button, Toast, Toggle Button, Check Box, Radio Button, Spinner, Web View, Edit Text, Date Picker, Time Picker, List View, Progress Bar, Analog and Digital clock, Handling UI events, List fragment, Dialog fragment

**UNIT-IV**

Working with Menus - Option menu,Context Menu, Popupmenu, Working With Images-ImageView, ImageSwitcher, Alert Dialog, Alarm manager, SMS messaging, Sending Email, Media Player, Using camera for taking pictures, recording video, Handling Telephony Manager

**UNIT- V**

Storing the data persistently-Introducing the Data Storage Options: The preferences, The Internal Storage, The External Storage, The Content Provider, The SQLite database, Connecting with the SQLite database and operations -Insert, Delete, Update, Fetch, Publishing android applications-preparing for publishing, Deploying APK files

**Course Outcome**

Upon successful completion, students should be able to:

1. Demonstrate the architecture, the ecosystem, features and tools to design mobile applications.
2. Create effective user interfaces that leverage evolving mobile device capabilities.
3. Design, customize and enhance mobile applications with widgets.
4. Develop user friendly mobile applications with application components.
5. Build database applications to provide comprehensive mobile development solutions.

**Text Books:**

1. Wei‐MengLee(2011),Beginning Android4 Application Development, Wiley Publishing, Inc.
2. Pradeep Kothari(2014), “Android Application Development (with KitKat support) Black Book”,DreamTech Press

**ReferenceBooks:**

1. James C.Sheusi(2013),“Android Application Development for Java Programmers”, Cengage Learning
2. MarkL Murphy(2009),“Beginning Android ”,Wiley India Pvt Ltd
3. Sayed YH ashimi and Satya Komatineni(2009),“ProAndroid”, Wiley India PvtLtd
4. RetoMeier, Professional Android4 Application Development,Wiley India PvtLtd

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| **IV B.TECH I SEM** | **PE V : MOBILE COMPUTING** | **L** | **T** | **P** | **C** |
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**UNIT-I:**  
**Mobile Communications**: An Overview- Mobile Communication-guided transmission, unguided transmission- signal propagation frequencies, antennae, modulation, modulation methods and standards for voice-oriented data communication standards, modulation methods and standards for data and voice communication, mobile computing- novel applications and limitations, mobile computing architecture, mobile system networks. Mobile devices and systems: Cellular networks and frequency reuse, Mobile smart phones, Smart mobiles and systems, handheld pocket computers, Handheld devices, Smart systems, Limitations of mobile devices

**UNIT-II:**  
**GSM and other 2G Architectures:** GSM-services and system architecture, Radio interfaces of GSM, Protocols of GSM, Localization, Call handling, GPRS system architecture. Wireless  
medium access control, CDMA, 3G,and 4G Communication: Modulation, Multiplexing, Controlling the medium access, Spread spectrum, Coding methods, IMT-20003G wireless communication standards, WCDMA 3G communication standards, CDMA 3G communication standards, Broadband

wireless access, 4g Networks.

**UNIT-III:**  
**Mobile IP Network layer: IP and Mobile IP network layers:** OSI layer functions, TCP/IP and Internet protocol, Mobile internet protocol; Packet delivery and Handover Management;  
Location Management: Agent Discovery; Mobile TCP

**Introduction to Mobile Adhoc network:** fixed infrastructure architecture, MANET infrastructure architecture; MANET: properties, spectrum, applications; Security in Ad-hoc network; Wireless sensor networks; sensor network applications.

**UNIT-IV:**  
**Synchronization:** Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependant specific rules for data synchronization, Personal information manager, synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server

**UNIT-V:**  
**Mobile Wireless Short Range Networks and Mobile Internet:** Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, IEEE 802.11protocol layers, Wireless application protocol (WAP)-WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), wireless transaction and session layers, wireless application environment.

**TEXTBOOK:**

1. RAJ KAMAL, “Mobile Computing,” second edition, Oxford.
2. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL,“Mobile Computing, Technology Applications and Service Creation',' Second Edition, McGraw Hill.
3. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer

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| **IV B.TECH I SEM** | **JE : ROBOTIC PROCESS AND AUTOMATION** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Course Objective:**

Students will understand how robotic process and automation is automating most repetitive computer-based tasks and processes in the work place like text, image automation with the sequence of actions, keyboard-based automation and Email automation etc.

**UNIT-I**

**Programming Basics & Recap:** Programming Basic Concepts, Understanding the application, Basic Web Concepts, Protocols, Email Clients, Data Structures, Data Tables, Algorithms, Software Processes, Software Design, Scripting, .Net Framework, .Net Fundamentals, XML, Control structures and functions, XML, HTML, CSS, Variables & Arguments.

**UNIT-II**

**RPA Concepts**: RPA Basics, History of Automation, What is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated, RPA Advanced Concepts, Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem.

**UNIT-III**

**RPA Tool Introduction & Basics:** Introduction to RPA Tool, The User Interface, Variables, Managing Variables, Naming Best Practices, The Variables Panel, Generic Value Variables, Text Variables, True or False Variables, Number Variables, Array Variables, Date and Time Variables, Data Table Variables, Managing Arguments, Naming Best Practices, The Arguments Panel, Using Arguments, About Imported Namespaces, Importing New Namespaces, Control Flow, Control Flow Introduction, If Else Statements, Loops, Advanced Control Flow, Sequences, Flowcharts, About Control Flow, Control Flow Activities, The Assign Activity, The Delay Activity, The Do While Activity, The If Activity, The Switch Activity, The While Activity, The For Each Activity, The Break Activity, Data Manipulation, Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data.

**UNIT-IV**

**Advanced Automation Concepts and Techniques:** Recording and Advanced UI Interaction, Recording Introduction, Basic and Desktop Recording, Web Recording, Input/output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques, Selectors, Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, Using tab for Images, Starting Apps, Excel Data Tables & PDF, Data Tablesin RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, Extracting a single piece of data, Anchors, Using anchors in PDF.

**UNIT-V**

**Email Automation & Exceptional Handling**: Email Automation, Email Automation, Incoming Email automation, Sending Email automation, Debugging and Exception Handling, Debugging Tools, Strategies for solving issues, Catching errors.

**Course Outcomes (COs)**

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

1. Demonstrate the fundamental concepts of programming languages and plat-forms.

2. Analyze the RPA tool concepts and in business applications.

3. Apply the advanced automation concepts to enhance the UI interaction in application software.

4. Apply the automation in real time applications: E-mail and exception handling.

**Text Books:**

1. Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing Release Date: March 2018 ISBN: 9781788470940.

**Reference Books:**

1. Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Liv-ingston (Author), Introduction to Robotic Process Automation: a Primer, Institute Of Robotic Process Automation.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots,Automate Repetitive Tasks & Become An RPA Consultant.
3. Srikanth Merianda, Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation.
4. https://www.uipath.com/rpa/robotic-process-automation