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Medbowli, Meerpet, Balapur, Hyderabad, Telangana – 500 097
*Phone: 9100377790, email: info@tkrcet.ac.in, web site: www.tkrcet.ac.in*

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

1.1.3 Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the institution during the last five years (10)
1.2.1 Percentage of new courses introduced of the total number of courses across all programmes offered during the last five years (20)

| Name of the Course | Course Code | Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development | Year of introduction (during the last five years) |
|---|---|---|---|
| Big Data Analytics | B57PE1 | Employability | 2022-23 |
| Network Security | B57PE1 | Employability | 2022-23 |
| Mobile Computing | B57PE1 | Skill development | 2022-23 |
| Cloud Computing | B57PE2 | Employability | 2022-23 |
| WebServices | B57PE2 | Employability | 2022-23 |
| Computer Graphics | B57PE2 | Entrepreneurship | 2022-23 |
| Machine Learning | B57PE4 | Employability | 2022-23 |
| Computer Forensics | B57PE4 | Employability | 2022-23 |
| Internet of Things | B57PE4 | Employability | 2022-23 |
| Predictive Analytics | B58PE1 | Employability | 2022-23 |
| Design Patterns | B58PE1 | Skill development | 2022-23 |
| Adhoc Wireless Networks | B58PE1 | Skill development | 2022-23 |
| Software Testing Methodologies | B58PE2 | Skill development | 2022-23 |
| Operation Research | B58PE2 | Skill development | 2022-23 |
| Storage Area Networks | B58PE2 | Skill development | 2022-23 |
| Object Oriented Analysis and Design | C55PC1 | Employability | 2022-23 |
| Python Programming | C55PC2 | Employability | 2022-23 |
| Computer Networks | C55PC3 | Skill development | 2022-23 |
| Compiler Design | C55PC4 | Employability | 2022-23 |
| Distributed Databases | C55PE5 | Employability | 2022-23 |
| Distributed Computing | C55PE5 | Entrepreneurship | 2022-23 |
| Network Protocol | C55PE5 | Employability | 2022-23 |
| . Information Theory & Coding | C55PE5 | Employability | 2022-23 |
| Software Process and Project Manager | C55PE5 | Employability | 2022-23 |
| Artificial Intelligence | C55PE5 | Employability | 2022-23 |
| Fundamentals of Management | CHSM2 | Skill development | 2022-23 |
| Data Warehousing and Data Mining | C56PC1 | Skill development | 2022-23 |
| Web Technologies | C56PC2 | Skill development | 2022-23 |
| Advanced Databases | C56PE3 | Skill development | 2022-23 |

| | | | |
|---|---|---|---|
| Mobile Computing | C56PE3 | Skill development | 2022-23 |
| Wireless Networks | C56PE3 | Employability | 2022-23 |
| Cryptography | C56PE3 | Employability | 2022-23 |
| Software Requirements Estimation | C56PE3 | Skill development | 2022-23 |
| Machine Learning | C56PE3 | Employability | 2022-23 |
| . Introduction to Analytics | C56PE4 | Employability | 2022-23 |
| Cloud Computing | C56PE4 | Entrepreneurship | 2022-23 |
| Mobile Ad hoc Networks | C56PE4 | Employability | 2022-23 |
| Network Security | C56PE4 | Employability | 2022-23 |
| Design Patterns | C56PE4 | Employability | 2022-23 |
| Deep Learning | C56PE4 | Employability | 2022-23 |
| Business Economics and Financial Anal | CHSM1 | Skill development | 2022-23 |
| Mathematical Foundations of Compute | CBSM4 M | Skill development | 2022-23 |
| Logic Circuits Design | CESLC1 | Skill development | 2022-23 |
| Database Management Systems | C53PC1 | Skill development | 2022-23 |
| Data Structures | C53PC2 | Skill development | 2022-23 |
| Operating Systems | C53PC3 | Employability | 2022-23 |
| Probability & Statistics | CBSM3 | Employability | 2022-23 |
| Computer Organization & Architecture | C54PC1 | Skill development | 2022-23 |
| Software Engineering | C54PC2 | Employability | 2022-23 |
| Design and Analysis of Algorithms | C54PC3 | Employability | 2022-23 |
| Formal Languages & Automata Theory | C54PC4 | Entrepreneurship | 2022-23 |
| Object Oriented Programming through | C54PC5 | Employability | 2022-23 |
| English for skill Enhancement | D1HSE1 | Employability | 2022-23 |
| Linear Algebra and Ordinary Differentia | D1BSM1 | Employability | 2022-23 |
| Engineering Chemistry | D1BSEC1 | Employability | 2022-23 |
| C Programming for Problem Solving | D1ESCP1 | Skill development | 2022-23 |
| IT Workshop and Elements of Compute | D1ESITW1 | Skill development | 2022-23 |
| Computer Aided Engineering Graphics | D1ESCEG | Skill development | 2022-23 |
| Business Economics and Financial Anal | D2HSBF | Skill development | 2022-23 |
| Statistical Methods and Vector Calculu | D2BSM5 | Skill development | 2022-23 |
| Applied Physics | D2BSAP1 | Skill development | 2022-23 |
| Basic Electrical Engineering | D2ESBEE | Skill development | 2022-23 |
| Data Structures | D2ESDS | Skill development | 2022-23 |

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ELECTRICAL AND ELECRONICS ENGINEERING

1.1.3 Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the institution during the last five years (10)

1.2.1 Percentage of new courses introduced of the total number of courses across all programmes offered during the last five years (20)

| Name of the Course | Course Code | Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development | Year of introduction (during the last five years) | Link to the relevant document |
|---|---|---|---|---|
| Linear Algebra &Applied Calculus | D1BSM1 | Skill development | 2022-23 | |
| Applied Chemistry | D2BSAC1 | Skill development | 2022-23 | |
| Electrical Circuits | D1ESEC1 | Employability | 2022-23 | |
| English Language & Communication Skills Lab | D2HSE2 | Employability | 2022-23 | |
| Applied Chemistry Lab | D2BSAC2 | Skill development | 2022-23 | |
| Electrical Circuits Lab | D1ESEC2 | Employability | 2022-23 | |
| Basic Workshop | D2ESBW1 | Employability | 2022-23 | |
| Mathematical Transforms | D2BSM3 | Employability | 2022-23 | |
| Engineering Physics | D1BSEP1 | Employability | 2022-23 | |
| Computer Aided Engineering Graphics | D1ESCEG | Employability | 2022-23 | |
| C Programming for Problem Solving | D1ESCP1 | Employability | 2022-23 | |
| Engineering Physics Lab | D1BSEP2 | Employability | 2022-23 | |
| Basic C Programming for Problem Solving Lab | D1ESCP2 | Employability | 2022-23 | |
| Probability, Numerical Methods and Complex | CBSM12 | Skill development | 2022-23 | |
| Network Analysis Lab | D2ESNA2 | Employability | 2022-23 | |
| Network Analysis | D2ESNA1 | Employability | 2022-23 | |
| Analog Electronics | C23PC | Employability | 2022-23 | |

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| Name of the Course | Course Code | Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development | Year of introduction (during the last five years) | Link to the relevant document |
|---|---|---|---|---|
| Electrical Machines-I | C23PC3 | Employability | 2022-23 | |
| Electro Magnetic Fields | C23PC4 | Employability | 2022-23 | |
| Analog Electronics Lab | C23PC5 | Skill development | 2022-23 | |
| Electrical Machines Lab-I | C23PC6 | Employability | 2022-23 | |
| Electrical Circuit Analysis Lab | C23PC7 | Skill development | 2022-23 | |
| Cultural Activity | MC003 | Skill development | 2022-23 | |
| Engineering Mechanics | CESEM1 | Skill development | 2022-23 | |
| Digital Electronics | C24PC1 | Employability | 2022-23 | |
| Electrical Machines-II | C24PC2 | Skill development | 2022-23 | |
| Control Systems | C24PC3 | Skill development | 2022-23 | |
| Power System-I | C24PC4 | Skill development | 2022-23 | |
| Digital Electronics Lab | C24PC5 | Skill development | 2022-23 | |
| Electrical Machines Lab –II | C24PC6 | Skill development | 2022-23 | |
| Control Systems Lab | C24PC7 | Skill development | 2022-23 | |
| Power Systems-I | C24PC4 | Skill development | 2022-23 | |
| Power Electronics | C25PC1 | Skill development | 2022-23 | |
| Microprocessors and Micro Controllers | C26PC3 | Skill development | 2022-23 | |
| 1. Electrical Machine Design | C25PE3 | Skill development | 2022-23 | |
| 2. Power System Dynamics and Control | C25PE3 | Skill development | 2022-23 | |
| 3. Digital Signal Processing | C25PE3 | Skill development | 2022-23 | |
| Smart Grid Technologies (OE- I) | C25OE5 | Skill development | 2022-23 | |
| Power Electronics Lab | C25PC7 | Skill development | 2022-23 | |
| Microprocessors and Micro Controllers Lab | C26PC7 | Skill development | 2022-23 | |
| Advanced Communication skills Lab | CHSE3 | Skill development | 2022-23 | |
| Power Systems-II | C25PC4 | Skill development | 2022-23 | |
| Electrical Measurements and Instrumentation | C25PC2 | Skill development | 2022-23 | |

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| Name of the Course | Course Code | Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development | Year of introduction (during the last five years) | Link to the relevant document |
|---|---|---|---|---|
| 1. Electrical Energy Conservation and Auditing | C26PE4 | Skill development | 2022-23 | |
| 2. Computer Architecture | C26PE4 | Skill development | 2022-23 | |
| 3. Line-Commutated and Active Rectifiers | C26PE4 | Skill development | 2022-23 | |
| Renewable Energy Sources | C26OE5 | Skill development | 2022-23 | |
| Electrical systems simulation Lab | C25PC6 | Skill development | 2022-23 | |
| Electrical Measurements and Instrumentation Lab | C25PC8 | Skill development | 2022-23 | |
| Power System Operation and Control | B27PC1 | Skill development | 2022-23 | |
| 1. Wind and Solar Energy Systems | B27PE2 | Skill development | 2022-23 | |
| 2. Hybrid Electrical Vehicles | B27PE2 | Skill development | 2022-23 | |
| 3. Flexible AC Transmission Systems | B27PE2 | Skill development | 2022-23 | |
| Power System Protection | B27PC3 | Skill development | 2022-23 | |
| Advanced Control systems | 2O7BA | Skill development | 2022-23 | |
| Power systems Lab | B27PC5 | Skill development | 2022-23 | |
| Project Stage-I | B27PW6 | Skill development | 2022-23 | |
| 1. HVDC Transmission Systems | B28PE1 | Skill development | 2022-23 | |
| 2. Computational Electromagnetics | B28PE1 | Skill development | 2022-23 | |
| 3. Electromagnetic Waves | B28PE1 | Skill development | 2022-23 | |
| 1. Industrial Electrical Systems | B28PE2 | Skill development | 2022-23 | |
| 2. Modern Control Theory | B28PE2 | Skill development | 2022-23 | |
| 3. Electrical Drives | B28PE2 | Skill development | 2022-23 | |
| 1. Utilization of Electrical Energy | B28PE3 | Skill development | 2022-23 | |
| 2. High Voltage Engineering | B28PE3 | Skill development | 2022-23 | |
| 3. Computer Aided Design of Electrical | B28PE3 | Skill development | 2022-23 | |
| Project Stage-II | B28PW4 | Skill development | 2022-23 | |
| Comprehensive Test | B28CT5 | Skill development | 2022-23 | |

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## COMPUTER SCIENCE&ENGINEERING (DATA SCIENCE)

**B.Tech I Year I Semester** **L/T/P/C 3/0/0/3**

## C PROGRAMMING FOR PROBLEM SOLVING (D1ESCP1)

**Course Objective:**
Learn the fundamentals of computers and C Programming concepts.

**Course Outcomes:**
After learning the contents of this course, the student must be able to

1. Learn the taxonomy of computers and C fundamentals
2. Demonstrate arrays and functions to write c programming
3. Write C programs using pointers and strings
4. Analyze and write C programs using structures and unions
5. Develop C programs for various applications using file I/O functions.

**UNIT I**

### Introduction to Computers Data Representation

Number Systems, Computer Languages, Algorithms. Introduction to C Language: Data types, Operators, Expressions, Statements-Selection Statements – if and Switch Statements, Repetition (Loop) statements.

**UNIT II**

### Arrays

One and two dimensional arrays, multidimensional arrays, inter function communication Arrays applications- linear search, binary search, bubble sort, Implementation of stacks and queues.
**Functions:** Scope and Extent, storage classes, recursive functions.

**UNIT III**

### Pointers

Introduction, Pointers for inter function communication, arrays of pointers, pointer arithmetic and arrays, passing an array to a function, memory allocation functions, pointers to functions, pointers to pointers.
**Strings:** Concepts, String Input/ Output functions, arrays of strings, string manipulation functions.

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**UNIT IV**

**User Defined Data types Structure and Unions**

Initialization, accessing structures, operations on structures. Complex structures-Nested structures, structures containing arrays, structures containing pointers, arrays of structures, structures and functions, Passing structures through pointers, self-referential structures, unions, bit fields, C programming examples, command–line arguments, pre-processor commands.

**UNIT V**

## Input and Output

Concept of a file, streams, text files and binary files, file input/output functions (standard library input/output functions for files), error handling, positioning functions (fseek, rewind and ftell).

**Text Books:**

1. Computer Science: A Structured Programming Approach Using C, B. A. Forouzan and R. F. Gilberg,Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh, Second Edition, Oxford University Press.

**Reference Books:**

1. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, Second Edition,Pearson education.
2. Programming with C, B. Gottfried, 3rd edition, Schaum's outlines, McGraw Hill Education (India) Pvt Ltd.
3. C From Theory to Practice, G S. Tselikis and N D. Tselikas, CRC Press.
4. Basic computation and Programming with C, Subrata Saha and S. Mukherjee, Cambridge University Press.

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## CSE (DATA SCIENCE)

**B.Tech III Semester**

**L/T/P/C**
**3 /0/ 0/ 3**

# DATABASE MANAGEMENT SYSTEMS (C83PC1)

**Course Objective:**

It emphasizes the understanding of the fundamentals of relational systems including data models, databases.

**Course Outcomes:**

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

1. Demonstrate the basic elements of a relational database management system, and identify the data models for relevant problems.
2. Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
3. Apply normalization for the development of application software.
4. Understand transaction processing, concurrency control and recovery techniques.
5. Understand the indexing data structures and hashing.

**UNIT I**
**Introduction and Basic Concepts**

File organization for conventional data management system, Higher-level file organization for DBMS, Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators. Relational Model-Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity, constraints, Querying relational data, Logical data base Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views.

**UNIT II**
**Relational Algebra and Calculus**

Preliminaries, Relational Algebra, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.

**Introduction to Database design**: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

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# DATABASE MANAGEMENT SYSTEMS (C83PC1)

## UNIT III
## SQL

SQL data definition and Data types, Schema and catalog concepts in SQL, Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values, Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases, NoSQL database (MongoDB introduction).
Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms - 1NF, 2NF, 3NF, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies.

## UNIT IV
## Transaction Management

Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, serializability and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels. Concurrency Control, Lock–Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi-version Schemes. Recovery System-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of non-volatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems.

## UNIT V
## Indexing

Index Data Structures, and Comparison with File Organizations. Tree-Structured Indexing, Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete., Hash- Based Indexing, Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

### Text Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition.
2. Database System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited I, 6th edition.

### Reference Books:

1. Database Systems, 6th edition, R Elmasri, Shamkant B.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley, Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

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## CSE (DATA SCIENCE)

**B.Tech IV Semester** **L/T/P/C 3 /0/ 0/ 3**

## DATA VISUALIZATION (C84PC4)

**Course Objectives:**

To understand the visual representation of structured and un structured data.

**Course Outcomes:**

After completion of course, the students will be able to

1. Understand the visualization and Data basics
2. Understand the Visualization process and know the representation of Spatial & Geo spatial data
3. Analyze various Visualization techniques for Multivariate data and other structures of data
4. Interacting the different operators and different data spaces
5. Design effective visualization of modern toolkits

**UNIT I**
**Introduction**

What is Visualization, History, Relationship visualization with other fields, The visualization Process, Pseudocode Conventions, The Scatter plot
**Data Foundations:** Types of Data, Structure within and between the records, Data Processing.

**UNIT II**
**Visualization Foundations**

The Visual Process, Semiology of Graphical Symbols, The Eight Visual Variables, Historical Perspective, Taxonomies.
Visualization Techniques for Spatial Data: One-Dimensional Data, Two-Dimensional Data, Three-Dimensional Data, Dynamic Data, Combining Techniques.
**Visualization Techniques for Geospatial Data**: Visualizing Spatial Data, Visualization of Point Data, Visualization of Line Data, Visualization of Area Data.

**UNIT III**
**Visualization Techniques for Multivariate Data**

Point-Based Techniques, Line-Based Techniques, Region-Based Techniques, Combinations of Techniques, Visualization Techniques for Trees, Graphs, and Networks: Displaying Hierarchical Structures, Displaying Arbitrary Graphs/Networks.

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# DATA VISUALIZATION (C84PC4)

**UNIT IV**
**Text and Document Visualization**

Levels of Text Representation, The Vector Space Model, Single Document Visualizations, Document Collection Visualizations.
**Interaction Concepts:** Interaction Operators, Interaction Operands and Spaces, A Unified Framework.
**Interaction Techniques:** Object Space, Data Space, Attribute Space, Data Structure Space, Visualization Structure Space, Animating Transformations, Interaction Control.

**UNIT V**
**Designing Effective Visualizations**

Steps in Designing Visualizations, Problems in Designing Effective Visualizations
**Comparing and Evaluating Visualization Techniques:** User Tasks, User Characteristics, Data Characteristics, Visualization Characteristics, Structures for Evaluating Visualizations.
**Visualization Systems:** Systems Based on Data Type, Systems Based on Analysis Type, Text Analysis and Visualization, Modern Integrated Visualization Systems, Toolkits

**Text Books:**

1. Interactive Data Visualization Foundations, Techniques, and Applications by Grinstein, Georges Keim, Daniel Ward, Matthew O , CRC Press Taylor & Francis Group.
2. Digital Image. Processing. Third Edition. Rafael C. Gonzalez. University of Tennessee. Richard E. Woods. NledData Interactive. Pearson International Edition.

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## CSE (DATA SCIENCE)

**B.Tech III Semester** **L/T/P/C**
**3 /0/ 0/ 3**

# INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING & DATA STRUCTURES USING JAVA (CESOP1)

**Course Objective:**

To understand the features of object-oriented paradigm and Data Structure concepts using JAVA programming Language.

**Course Outcomes:**

After completion of course, the students will be able to

1. Understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods
2. Implement the inheritance concept
3. Solve the exceptions in programs and recursion
4. Implement the Basic data structures and operations
5. Apply the ADTs and use the collections in Java

**UNIT I**
**Object-Oriented Thinking**

A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. History of object-oriented programming, overview of java, Object oriented design, Structure of java program, Java buzzwords, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

**Stream based I/O (java.io)**: The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output

**UNIT II**
**Inheritance**

Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

Packages

Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces Defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

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# INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING & DATA STRUCTURES USING JAVA (CESOP1)

## UNIT III
**Exception Handling**

Fundamentals of exception handling, Exception types, Termination or presumptive models, Uncaught exceptions, using try and catch, multiple catch classes, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.
**Recursion:** Analyzing Recursion Algorithms, Designing of Recursive Algorithms.

## UNIT IV
**Sorting, Searching & Data Structure**

Introduction to Sorting, Bubble Sort, Insertion Sort, Introduction to Searching, Linear Search and Binary Search.
**Data Structures Fundamentals:** Using Arrays, Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists.

## Unit V
**Stacks, Queues, and Deques**

Stack, Queue, Double – ended queues.
List and Iterator ADTs: The List ADT, Array List, Positional Lists, Iterators, Java Collection Frameworks

**Text Books:**

1. Java The complete reference, 9 th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Data Structures & Algorithms in Java 6th Edition, Michale T. Goodrich, Roberto Tamssia, Michale H. Goldwasser, WILEY.

**Reference Books:**

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, and Universities Press.

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## COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

**B.Tech. I Year II SEMESTER**

**L/T/P/C**
**3/0/0/3**

## INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING &DATA STRUCTURES USINGJAVA (D2ES1OJ)

**Course Objective:**

To understand the features of object-oriented paradigm and Data Structure concepts using JAVA programming Language.

**Course Outcomes:**

After completion of course, the students will be able to

1. Understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods
2. Implement the inheritance concept
3. Solve the exceptions in programs and recursion
4. Implement the Basic data structures and operations
5. Apply the ADTs and use the collections in Java

**UNIT I**

**Object-Oriented Thinking**

A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. History of object-oriented programming, overview of java, Object oriented design, Structure of java program, Java buzz words, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

**Stream basedI/O(java.io)**:The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output

**UNIT II**

**Inheritance**

Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-adhoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance.

Packages: Defining a Package, CLASSPATH, Access protection, importing packages, Interfaces Defining an interface, implementing interfaces, Nested interfaces, applying interfaces,variables in interfaces and extending interfaces.

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**UNIT III**

**Exception Handling**

Fundamentals of exception handling, Exception types, Termination or presumptive models, Uncaught exceptions, using try and catch, multiple catch classes, nested try statements, throw, throws and finally,built-in exceptions, creating own exception sub classes.

**Recursion:**Analyzing RecursionAlgorithms, Designing of Recursive Algorithms.

**UNIT IV**

**Sorting, Searching & Data Structure**

Introduction to Sorting, Bubble Sort, Insertion Sort, Introduction to Searching, Linear Search and Binary Search.

**Data Structures Fundamentals:** Using Arrays, Singly Linked Lists, Circularly Linked Lists, Doubly Linked Lists.

**Unit V**

**Stacks, Queues ,and Deques**

Stack,Queue,Double–ended queues ,List and Iterator

ADTs:The List ADT,Array List, Positional Lists, Iterators, Java Collection Frameworks

## Text Books:

1.Java The complete reference, 9thedition,Herbert Schildt, Mc Graw Hill Education(India)Pvt.Ltd.

2.Data Structures & Algorithms in Java 6th Edition, Michale T.Goodrich, Roberto Tamssia, MichaleH. Goldwasser, WILEY.

## Reference Books:

1.An Introduction to programming and OOdesign using Java, J.Nino and F.A.Hosch, John Wiley & sons.

2.Introduction to Java programming, Y. Daniel Liang, Pearson Education.

3.Object Oriented Programming through Java, P. Radha Krishna, and Universities Press.

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# CSE (DATA SCIENCE)

## MACHINE LEARNING – C85PC2

**B.Tech. V Semester**

**L/T/P/C**
**3/0/0/3**

**COURSE OBJECTIVES:**

To be able to formulate machine learning problems corresponding to different applications and range of machine learning algorithms along with their strengths and weaknesses

**COURSE OUTCOMES:**

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

1. Understand the basic concepts such as decision trees and neural networks.
2. Develop the ability to formulate machine learning techniques to respective problems.
3. Apply machine learning algorithms to solve problems of moderate complexity.

**UNIT-I:**

**Introduction** - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

**Concept Learning And The General To Specific Ordering** – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

**UNIT-II:**

**Decision Tree Learning** – Introduction, Decision tree representation, appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search indecision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

**Artificial Neural Networks** – Introduction, Neural network representation, appropriate problems for neural network learning, Perceptron, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

**Evaluation Hypotheses** – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

**UNIT-III:**

**Bayesian Learning** – Overview of Bayes theorem principle, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier.

**Computational Learning Theory** – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space.

**Instance-Based Learning** - Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

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**UNIT-IV:**

**Learning Sets of Rules** – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL.

**Analytical Learning** - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation- Based Learning, Explanation-Based Learning-Discovery new features.

**UNIT V:**

**Combining Inductive and Analytical Learning** – Motivation, Inductive-Analytical approaches to Learning.

Reinforcement Learning and Q Learning.

**TEXT BOOKS:**

1. Machine Learning – Tom M. Mitchell, -MGH
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis(CRC)

**REFERENCE BOOKS:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, WilliamW Hsieh, Cambridge Univ Press.
2. Richard o.Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley& Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press,1995



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# CSE (DATA SCIENCE)

## NATURAL LANGUAGE PROCESSING - C86PC1

**B.Tech. VI Semester** **L/T/P/C 3 /1/ 0/ 4**

### COURSE OBJECTIVE:

Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

### COURSE OUTCOMES:

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

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.
3. Able to design, implement, and analyze NLP algorithms
4. Able to design different language modeling Techniques.

### UNIT – I:

**Finding the Structure of Words**: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

### UNIT – II:

**Syntax Analysis**: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

### UNIT – III:

**Semantic Parsing**: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

### UNIT – IV:

**Predicate Argument Structure**: Resources, System, Softwares, Meaning Representation: Resources, System, Software.

### UNIT – V:

**Language Modeling**: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

### TEXT BOOKS:

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

### REFERENCE BOOKS:

1. Speech and Natural Language Processing – Daniel Jurafsky & James H Martin, Pearson Publications.

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## CSE (DATA SCIENCE)

**B.Tech IV Semester** **L/T/P/C**
**3 /0/ 0/ 3**

## PYTHON PROGRAMMING (C84PC5)

**Course Objective:**

Enable the student to do Python Programming which includes Regular Expressions and GUI

**Course Outcomes:**

After completion of course the student will be able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

**UNIT I**
**Introduction**

Introduction to Python, History, Need of Python Programming, features Applications, python environment setup, Basic syntax, Variables, Data Types, Keywords, Input-Output, Indentation, script structure, Running Python Scripts.
**Operators:** Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Conditional statements if, if-else Looping Control Structures for, while Control Statements: Break, Continue, Pass.

**UNIT II**
**Functions**

Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.
**Data Structures :** Lists, Tuples, dictionaries, sets, Sequences, Comprehensions.

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# PYTHON PROGRAMMING (C84PC5)

**UNIT III**
**Regular Expressions**

Introduction/Motivation , Special Symbols and Characters, REs and Python.
OBJECT ORIENTED PROGRAMMING IN PYTHON
Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding. ERROR AND EXCEPTIONS Difference between an error and Exception, Handling exceptions, try, except block, Raising Exceptions and User Defined Exceptions.

**UNIT IV**
**Files**

File input/output, Text processing file functions.
MODULES and Introduction to Packages, Creating modules, import statement, from. Name spacing. Packages, using packages, implementing packages: numpy, iterator tools, scipy, matplotlib.

**UNIT V**
**GUI Programming**

Introduction, Tkinter and Python Programming, Brief Tour of other GUIs, Related Modules and other GUIs.
**Database Programming:** Introduction, Python Database, Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

**Text Book:**

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

**Reference Books:**

1. Allen Downey, "Think Python", Second Edition , Green Tea Press.
2. Introduction to Computation & Programming Using Python, Spring 2013 Edition, By John V.Guttag.
3. 3. Programming in Python 3: A Complete Introduction to the Python Language (Developer's Library), by Mark Summerfield, 2nd Edition.

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## CSE (DATA SCIENCE)

**B.Tech III Semester** **L/T/P/C**
**3 /0/ 0/ 3**

## R PROGRAMMING (C83PC3)

**Course Objectives:**

Gain knowledge on statistical data manipulation and analysis.

**Course Outcomes:**

After competition of this course, the students will be able to

1. Understand the basic functions of R and Create vectors in R.
2. Gain knowledge on creation of matrices and arrays in R.
3. Gain knowledge on creation of Factors and Data frames in R.
4. Understand and implement the searching and sorting techniques in R. and the file concepts in R.
5. Automate analyses and create new functions that extend the existing language features. Incorporates features found in object-oriented and functional programming languages.

**UNIT I**
**Introduction to R**

Introduction, Functions, Preview of Some Important R Data Structures, Regression Analysis of Exam Grades, Startup and Shutdown, Getting Help, The help() Function, The example() Function. Vectors, Scalars, Vectors, Arrays, and Matrices, Declarations, Common Vector Operations, Using all() and any(), Vectorized Operations, NA and NULL Values, Filtering, Vectorized if-then-else.

**UNIT II**
**Matrices and Arrays**

Creating Matrices, General Matrix Operations, Applying Functions to Matrix Rows and Columns, More on the Vector/Matrix Distinction, Avoiding Unintended Dimension Reduction, Naming Matrix Rows and Columns, Higher-Dimensional Arrays.
**Lists:** Creating Lists, General List Operations, Accessing List Components and Values Applying Functions to Lists, Recursive Lists.

**UNIT III**
**Data Frames**

Creating Data Frames, Other Matrix-Like Operations, Merging Data Frames, Applying Functions to Data Frames.
**Factors and Tables:** Factors and Levels, Common Functions Used with Factors, Working with Tables, Other Factor-and Table-Related Functions.

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# R PROGRAMMING (C83PC3)

**UNIT IV**
**R Programming Structures**

Control Statements, Arithmetic and Boolean Operators and Values, Default Values for Arguments, Return values, Functions Are Objects, Environment and Scope Issues, No Pointers in R, Writing Upstairs, Recursion, Replacement Functions, Anonymous Functions.
**Math and Simulations in R:** Math Functions, Functions for Statistical, Sorting, Set Operations.

**UNIT V**
**Files**

Accessing the Keyboard and Monitor, Reading and Writing Files, Accessing the Internet.
**String Manipulation**: String-Manipulation Functions.
**Graphics:** Creating Graphs, Customizing Graphs.

**Text Books:**

1. The Art of R Programming by Norman Matloff-No Starch Press.

**Reference Books:**

1. R Programming for Bioinformatics by Robert Gentleman—CRC Press.
2. Data Analytics using R by Seema Acharya-TMH.
3. Hands-On Programming with R by Grrett Grolemund-OREILLY.
4. Beginners guide for Data Analytics using R by Jeeva Jose-Khanna Publications.
5. R for Beginners by Sandip Bakshit-TMH.

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# CSE (DATA SCIENCE)

## Web Technologies - C85PC1

**B.Tech. V Semester**

**L/T/P/C**
**3/0/0/3**

**COURSE OBJECTIVE:**

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP To introduce Client-side scripting with Javascript and AJAX

**COURSE OUTCOMES:**

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

1. Gain knowledge on implementing server side scripting using PHP, know how to store and process data using XML.
2. Understand how to handle http requests based on the knowledge of servelets
3. Learn to implement server side programming with servelets, JSP
4. Learn to implement client side scripting, validation of forms, JS, AJAX programming.

**UNIT – I:**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT – II:**

XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.CSE (DS) R20

**UNIT – III:**

**Introduction to Servlets:** Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization Parameters, Handling HTTP Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**UNIT – IV:**

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT – V:**

**Client-side Scripting:** Introduction to Javascript: Javascript language – declaring variables, the scope of variables, functions, event handlers (click, on submit etc.), Document Object Model, Form validation, Simple AJAX application.

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## TEXTBOOK

1. Web Technologies, Uttam K Roy, Oxford UniversityPress.
2. The Complete Reference PHP – Steven Holzner, TataMcGraw-Hill.

## REFERENCE BOOKS

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech.
2. Java Server Pages –Hans Bergsten, SPD O'Reilly Java Script, D. Flanagan, O'Reilly,SPD.
3. Beginning Web Programming-Jon Duckett WROX.
4. Programming World Wide Web, R. W. Sebesta, Fourth Edition, Pearson.
5. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

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