

# Sreenivasa Institute of Technology and Management Studies (Autonomous) Chittoor - 517127 Department of Computer Science and Engineering (Data Science)

# Minutes of BOS Meeting held on 06.07.2024

The 4th Board of Studies Meeting of the Department of Computer Science and Engineering (Data Science) is held on 06.07.2024 through online mode (Google Meet) at 11:00 A.M.

## **Members Present:**

S.No	Name of the members (with full address)	Role
1.	Mr. A.Srinivasan Associate Professor and Head Department of Computer Science and Engineering (Data Science), Sreenivasa Institute of Technology and Management Studies, Chittoor Email: hodds@sitams.org	BOS Chairman
2.	<b>Dr.K.Madhavi</b> <b>Professor &amp; Coordinator,</b> Future Skills & Incubation Centre JNT University Anantapur, Ananthapuramu Email : kasamadhavi.cse@jntua.ac.in	University Nominee
3.	Dr. D.Venkatesh, Associate Professor, Dept of CSE, GITAM University Bengalore. Email: vdevaray@gitam.edu	Subject Expert-I
4.	<b>Dr Syed Muzamil Basha,</b> Associate Professor, REVA University, Bengalore. Email: <b>muzamilbasha.s@reva.edu.in</b>	Subject Expert-II

S.No	Name of the members (with full address)	Role
	Mr S.Dhanesh,	
5.	Sr Data Engineer,	Industry Expert
	Walmart, Bengalore.	
	Email:dhaneshsalla@gmail.com	
	Mr Omkar Rayapeddi,	
	Engineering Manager,	
6	NetAPP INC, Bengalore.	
0.	Email: omkar.rayapeddi@gmail.com	Alumni
7.	Mr M.E Palanivel	
	Professor & Head of CSE,	Internal Member
2	SITAMS, Chittoor	
8.	Dr. R. Munipraveena	
	Associate Professor & HOD-CSE(AI)	Internal Member
	SITAMS, Chittoor	
9.	Mr. E. Purusotham,	
	Associate Professor of CSE,	Internal Member
	SITAMS, Chittoor	
10.	Mr G Yuvaraju	· · · · · · · · · · · · · · · · · · ·
	Assistant Professor of CSE-DS,	Internal Member
	SITAMS, Chittoor	

In the beginning of the meeting M**r. A. Srinivasan**, Chairman-BoS, welcomed all the members and briefed them about the progress of the Department of Computer Science and Engineering (Data Science).

**Dr. N. Venkatachalapthi**, Principal briefed about the importance of updated curriculum and syllabus. He requested valuable inputs from the members and handed over the session to Mr. **A.Srinivasan**, Chairman – BOS.

# <u>R23- Course Structure of II Year B.Tech III and IV Semester -CSE (Data Science) and</u> <u>Syllabi of R23 II Year B.Tech III and IV Semester- CSE (Data Science).</u>

The BOS Chairman presented the course structure and syllabi of II Year B.Tech III and IV Semester - CSE (Data Science). It is resolved to accept the same after thorough discussion and taking into consideration of the suggestions and remarks given by the members.

The members of BOS have given the following suggestions:

- 1. Dr. K.Madhavi suggested to change the reference book for the subject Advanced Data Structures and Algorithm analysis in II Year III Semester -The suggestion is accepted and incorporated.
- 2. Mr. S.Dhanesh recommended to develop a small project using any IDE and insisted to develop a executable jars in Object Oriented programming through java Lab in II B.Tech III Semester.

-The suggestion is accepted and incorporated.

3. Dr.D.Venkatesh suggested to incorporate scenario based program questions Object Oriented programming through java Lab in II B.Tech III Semester.

-The suggestion is accepted and in addition to regular lab programs, we make students to practice scenario based question.

4. Dr Syed Muzamil Basha suggested to conduct club activities in association with IEEE/CSI/ACM Society

-The suggestion is accepted and we will organize the events under club activity

5. Dr Syed Muzamil Basha suggested to give training for documentation of projects from I Year onwards.

-Suggestion is accepted and we try to conduct training programs as value added course.

6. Mr.S.Dhanesh recommended the students to participate in Hackathon events to enhance their coding skills

-The suggestion is accepted and we will motivate our students to participate

7. Mr.S.Dhanesh appreciated that the Practical courses are as per the Industry standards

-The suggestion is accepted

8. Dr K.Madhavi recommended to publish papers in UGC Care journals alone. -*The suggestion is accepted*  9. Dr K.Madhavi informed to include Board of Studies members in the panel of question paper setters and examiners list

-The suggestion is accepted and included in the Panel list

The board has suggested chairman of BoS-CSE(Data Science) to make the necessary changes and corrections in R23 B.Tech curriculum by discussing with curriculum development cell (CDC) members.

The meeting was concluded with a vote of thanks by Mr.A.Srinivasan BOS Chairman.

S.No	Name of the member	Designation	Signature
1	Mr A Srinivasan	Associate Professor & HOD-CSE(DS) SITAMS, Chittoor	Amt
2	Dr K Madhavi	<b>Professor &amp; Coordinator,</b> Future Skills & Incubation Centre JNT University Anantapur	online
3	Dr D Venkatesh	Associate Professor GITAM University Bengalore.	online
4	Dr Syed Muzamil Basha	Associate Professor, REVA University, Bengalore	Online
5	Mr S.Dhanesh	Sr Data Engineer, Walmart Bengalore	Online
6	Mr Omkar Rayapeddi,	Engineering Manager, NetAPP INC Bengalore	Online
7	Mr M.E Palanivel	Professor & Head of CSE, SITAMS, Chittoor	OHE
8	Dr. R. Munipraveena	Associate Professor & HOD-CSE(AI) SITAMS, Chittoor	Ramon-
9	Mr. E. Purusotham,	Associate Professor of CSE, SITAMS, Chittoor	8. Juni
10	Mr G Yuvaraju	Assistant Professor of CSE-DS, SITAMS, Chittoor	Gyme_

Mr A Srinivasan BOS Chairman

#### SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (Autonomous) DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science) <u>B.Tech- R23 - COURSE STRUCTURE AND SYLLABI</u>

#### Semester III (Second Year)

S-No	Course	Course Title	Course	I Ho	Sch nstr urs	eme o uctio per W	of ns /eek	Scheme of Examination Maximum Marks		
00	Code		Category	L	Т	Ρ	С	Ι	E	Total
1	23BSC23x	Discrete Mathematics & Graph Theory	BSC	3	0	0	3	30	70	100
2	23HSM23X	Universal Human Values– Understanding Harmony& Human Ethical Conduct	НЅМС	2	1	0	3	30	70	100
3	23CSD231	Introduction to Data Science	PCC	3	0	0	3	30	70	100
4	23CSE231	Advanced Data Structures & Algorithm Analysis	PCC	3	0	0	3	30	70	100
5	23CSE232	Object Oriented Programming Through Java	PCC	3	0	0	3	30	70	100
6	23CSD232	Data Science Lab	PCC	0	0	3	1.5	30	70	100
7	23CSE234	Object Oriented Programming Through Java Lab	PCC	0	0	3	1.5	30	70	100
8	23CSE235	Python Programming	SOC	0	1	2	2	30	70	100
9	23MAC23x	Environmental Science	MAC	2	0	0	-	Ρ	-	-
Conta	act Hours per v	week		16	2	8	20	-	-	-
Total	Hours per wee	ek		26 -		-	-	-	-	
Total	credits						20	-	-	-
Total	Marks							240	560	800

#### Semester IV (Second Year)

S.No	Course	Course Title	Course	) Ho	Sch Instr ours	eme o uctior per W	f 15 eek	Scheme of Examination Maximum Marks		
	Code		Category	L	Т	Ρ	С	Ι	E	Total
1	23BSC24x	Optimization Techniques	BSC	2	0	0	2	30	70	100
2	23CSD241	Statistical methods for Data science	PCC	3	0	0	3	30	70	100
3	23CSD242	Data Engineering	PCC	3	0	0	3	30	70	100
4	23CSE242	Database Management Systems	PCC	3	0	0	3	30	70	100
5	23ECE2xx	Digital Logic& Computer Organization	ECE	3	0	0	3	30	70	100
6	23CSE244	Data Engineering Lab	PCC	0	0	3	1.5	30	70	100
7	23CSE245	Database Management Systems Lab	PCC	0	0	3	1.5	30	70	100
8	23CSE246	Exploratory Data Analysis with Python	SOC	0	1	2	2	30	70	100
9	23MECxxx	Design Thinking & Innovation	BSH	1	0	2	2	30	70	100
Conta	act Hours per v	veek		15	1	10	21	-	-	-
Total	Hours per wee	ek			26		-	-	-	-
Total credits							21	-	-	-
Total Marks 270 630 900									900	
Ма	ndatory Com	nmunity Service Project Internship	of 08 wee	ks d	urati	ion du	ring s	summ	ner Va	cation



23CSD231

# II B. Tech III Semester INTRODUCTION TO DATA SCIENCE CSE(DS)

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**PRE-REQUISITES:** A course on Introduction to Programming

# COURSE EDUCATIONAL OBJECTIVES:

- 1. Knowledge and expertise to become a data scientist.
- 2. Essential concepts of statistics and machine learning that are vital for data science;
- 3. Significance of exploratory data analysis (EDA) in data science.
- 4. Critically evaluate data visualizations presented on the dashboards
- 5. Suitability and limitations of tools and techniques related to data science process

# UNIT-I: INTRODUCTION TO DATA SCIENCE

Introduction to Data science, benefits and uses, facets of data, data science process in brief, big data ecosystem and data science

Data Science process: Overview, defining goals and creating project charter, retrieving data, cleansing, integrating and transforming data, exploratory analysis, model building, presenting findings and building applications on top of them.

# UNIT-II: APPLICATIONS OF MACHINE LEARNING IN DATA SCIENCE (9)

Applications of machine learning in Data science, role of ML in DS, Python tools like sklearn, modelling process for feature engineering, model selection, validation and prediction, types of ML, semi-supervised learning

Handling large data: problems and general techniques for handling large data, programming tips for dealing large data, case studies on DS projects for predicting malicious URLs, for building recommender systems

# UNIT-III: NOSQL MOVEMENT FOR HANDLING BIGDATA

NoSQL movement for handling Bigdata: Distributing data storage and processing with Hadoop framework, case study on risk assessment for loan sanctioning, ACID principle of relational databases, CAP theorem, base principle of NoSQL databases, types of NoSQL databases, case study on disease diagnosis and profiling

# UNIT-IV: TOOLS AND APPLICATIONS OF DATA SCIENCE

Tools and Applications of Data Science: Introducing **Neo4j**for dealing with graph databases, graph query language **Cypher**, Applications graph databases, Python libraries like nltk and SQLite for handling Text mining and analytics, case study on classifying Reddit posts

# UNIT-V: DATA VISUALIZATION AND PROTOTYPE APPLICATION DEVELOPMENT(9)

Data Visualization and Prototype Application Development: Data Visualization options, Crossfilter, the JavaScript MapReduce library, Creating an interactive dashboard with dc.js, Dashboard development tools. Applying the Data Science process for real world problem solving scenarios as a detailed case study.



#### **COURSE OUTCOMES:**

On sı	iccessful completion of the course, students will be able to	Pos
CO1	Understand significance of Data Science.	P01,P02,P03
CO2	Analyze large data	PO1,PO2, PO3,PO4,PO5
CO3	Apply machine learning in Data Science	P01,P02,P03
CO4	Perform Data reduction and apply visualization techniques.	P01,P02,P03, P04,P05
CO5	Perform and Apply real world problems	P01,P02,P03, P04

#### **TEXT BOOKS:**

- 1. Davy Cielen, Arno D.B.Meysman, and Mohamed Ali, "Introducing to Data Science using Python tools", Manning Publications Co, Dreamtech press, 2016
- 2. Prateek Gupta, "Data Science with Jupyter" BPB publishers, 2019 for basics

#### **REFERENCE BOOKS:**

- 1. Joel Grus, "Data Science From Scratch", OReilly, 2019
- 2. Doing Data Science: Straight Talk From The Frontline, 1 st Edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013

#### **REFERENCE WEBSITE:**

- 1. <u>https://towardsdatascience.com</u>
- 2. <u>https://www.datacamp.com</u>
- 3. <u>https://www.coursera.org</u>
- 4. <u>https://www.datasciencecentral.com</u>
- 5. <u>https://www.analyticsvidhya.com</u>

#### 6. <u>https://www.kdnuggets.com</u>

#### **CO-PO MAPPING**

CO/PO	P01	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	P05	<b>PO6</b>	P07	<b>P08</b>	P09	PO10	P011	PO12
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	3	2	-	-	-	-	-	-	-
CO.3	3	3	3	-	-	-	-	-	-	-	-	-
CO.4	3	3	3	-	-	-	-	-	-	-	-	-
CO.5	3	3	3	3	2	-	-	-	-	-	-	-
<b>CO</b> *	3	3	3	3	2	-	-	-	-	-	-	-

# **II B.Tech - III Semester**

**ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS** LTPC 3003

(Common to CSE, CSM, CAI, CSD)

## **PRE-REQUISITES: A course on Data Structures**

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Provide knowledge about algorithm analysis using time complexity and space complexity, and to introduce the concept of AVL trees and B trees.
- 2. To understand the concepts of Heap trees, Basics of Graphs and Divide and Conquer algorithm design strategy.
- 3. To gain knowledge of Greedy and Dynamic programming approach to problem solving.
- 4. To Understand back tracking and branch and bound strategies for solving the complex problems
- 5. To Develop skills of deciding a problem is solvable or not using NP hard and NP complete class problem.

#### **UNIT 1:**

Introduction to Algorithm Analysis, Space and Time Complexity analysis, AsymptoticNotations.AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees – Creation, Insertion, **Deletion operations and Applications** 

#### **UNIT 2:**

Heap Trees (Priority Queues) - Min and Max Heaps, Operations and Applications Graphs -Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applicationsDivide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

#### **UNIT 3:**

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest PathsDynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths- General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

#### **UNIT 4:**

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

#### **UNIT 5:**

NP Hard and NP Complete Problems: Basic Concepts, Cook's theoremNP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

**Total Hours: 45** 

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# **COURSE OUTCOMES:**

On su	ccessful completion of the course the student will be	POs related to COs
C01	Illustrate the working of the advanced tree data structures and their applications (L2)	PO1, PO2, PO3
CO2	Understand the Graph data structure, traversals and apply them in various contexts. (L2)	PO1, PO2, PO3
СО3	Use various data structures in the design of algorithms (L3)	PO1, PO2,PO3,PO4
CO4	Recommend appropriate data structures based on the problem being solved (L5)	PO1,PO2
C05	Analyze algorithms with respect to space and time complexities (L4)	PO1, PO2,PO3,PO4

### **TEXT BOOKS:**

- 1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2<sup>nd</sup>Edition Universities Press
- 2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran, 2<sup>nd</sup>Edition University Press

### **REFERENCES**:

- 1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
- 2. An introduction to Data Structures with applications, Trembley& Sorenson, McGraw Hill
- 3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
- 4. Data Structures using C & C++: Langsam, Augenstein&Tanenbaum, Pearson, 1995
- 5. Algorithms + Data Structures & Programs:, N.Wirth, PHI
- 6. Fundamentals of Data Structures in C++: Horowitz Sahni& Mehta, Galgottia Pub.
- 7. Data structures in Java:, Thomas Standish, Pearson Education Asia

#### **REFERENCE WEBSITE:**

- 1. <u>https://www.tutorialspoint.com/advanced\_data\_structures/index.asp</u>
- 2. <u>http://peterindia.net/Algorithms.html</u>
- 3. https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-029szjTrs\_0

CO- PO	P01	PO2	PO3	P04	P05	P06	P07	P08	PO9	PO10	P011	P012
CO1	3	3	3		-	-	-	-	-	-	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
<b>CO</b> *	3	3	3	3	-	-	-	-	-	-	-	-

# **CO-PO MAPPING:**

#### II B.TECH - III SEMESTER 23CSE232 OBJECT ORIENTED PROGRAMMING THROUGH JAVA L T P C (Common to CSE, CSM, CAI, CSD) 3 0 0 3

#### PRE-REQUISITES: A course on Introduction to Programming

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Identify Java language components and how they work together in applications
- 2. Learnthe fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- 3. learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- 4. understand how to design applications with threads in Java
- 5. understand how to use Java APIs for program development

#### UNIT 1:

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Object Oriented Programming: Basic concepts, Principles

**Program Structure in Java:** Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

**Data Types**, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final,

**Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator ( = ), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

**Control Statements**: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

#### UNIT 2:

**Classes and Objects:** Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

**Methods:** Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

#### UNIT 3:

**Arrays:** Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

**Inheritance:** Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

**Interfaces:** Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

# UNIT 4:

**Packages and Java Library:** Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto- unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

**Exception Handling:** Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

**Java I/O and File:** Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

# UNIT 5:

**String Handling in Java:** Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

**Multithreaded Programming:** Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

**Java Database Connectivity:** Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

**Java FX GUI:** Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Total Hours: 45

#### COURSE OUTCOMES:

On su	ccessful completion of the course the student will be	POs related to Cos
CO1	Analyse problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)	PO1, PO2, PO5
CO2	Design and implement classes to model real-world entities, with a focus on attributes, behaviours, and relationships between objects (L4)	PO1, PO4,PO5
СО3	Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)	PO1,PO3,PO4, PO5

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CO4	Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)	PO1,PO4, PO5
C05	Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX.(L3)	PO1, PO2, PO4, PO5

#### **TEXT BOOKS:**

- 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
- 2) Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
- 3) JAVA for Programmers, Paul Deitel, Harvey Deitel, 4<sup>th</sup> Edition, Pearson.

#### **REFERENCES**:

- 1) The complete Reference Java, 11<sup>th</sup>edition, Herbert Schildt, TMH
- 2) Introduction to Java programming, 7<sup>th</sup> Edition, Y Daniel Liang, Pearson

#### **REFERENCE WEBSITE:**

- 1) <u>https://nptel.ac.in/courses/106/105/106105191/</u>
- 2) <u>https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_012880</u> <u>464547618816347\_shared/overview</u>

#### **CO-PO MAPPING:**

CO- PO	P01	PO2	PO3	PO4	P05	P06	P07	P08	PO9	PO10	P011	P012
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	2	-	-	3	3	-	-	-	-	-	-	-
CO3	3	-	3	3	3	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	-	-	-	-	-	-
CO5	2	3	-	3	3	-	-	-	-	-	-	-
<b>CO</b> *	2.6	3	3	3	2.8	-	-	-	-	-	-	-



23CSD232

#### II B.Tech III Semester DATA SCIENCE LAB (CSE(DS))

L T P C 0 0 3 1.5

**PRE-REQUISITES:** A course on Introduction to Programming

#### **COURSE EDUCATIONAL OBJECTIVES:**

1. The main objective of the course is to inculcate the basic understanding of Data Science and its practical implementation using Python.

#### LIST OF EXPERIMENTS

- 1. Creating a NumPy Array
  - a. Basic ndarray
  - b. Array of zeros
  - c. Array of ones
  - d. Random numbers in ndarray
  - e. An array of your choice
  - f. Imatrix in NumPy
  - g. Evenly spaced ndarray
- 2. The Shape and Reshaping of NumPy Array
  - a. Dimensions of NumPy array
  - b. Shape of NumPy array
  - c. Size of NumPy array
  - d. Reshaping a NumPy array
  - e. Flattening a NumPy array
  - f. Transpose of a NumPy array
- 3. Expanding and Squeezing a NumPy Array
  - a. Expanding a NumPy array
  - b. Squeezing a NumPy array
  - c. Sorting in NumPy Arrays
- 4. Indexing and Slicing of NumPy Array
  - a. Slicing 1-D NumPy arrays
  - b. Slicing 2-D NumPy arrays
  - c. Slicing 3-D NumPy arrays
  - d. Negative slicing of NumPy arrays
- 5. Stacking and Concatenating Numpy Arrays
  - a. Stacking ndarrays
  - b. Concatenating ndarrays
  - c. Broadcasting in Numpy Arrays
- 6. Perform following operations using pandas
  - a. Creating dataframe
  - b. concat()
  - c. Setting conditions
  - d. Adding a new column
- 7. Perform following operations using pandas
  - a. Filling NaN with string



- b. Sorting based on column values
- c. groupby()
- 8. Read the following file formats using pandas
  - a. Text files
  - b. CSV files
  - c. Excel files
  - d. JSON files
- 9. Read the following file formats
  - a. Pickle files
  - b. Image files using PIL
  - c. Multiple files using Glob
  - d. Importing data from database
- 10. Demonstrate web scraping using python
- 11. Perform following preprocessing techniques on loan prediction dataset
  - a. Feature Scaling
  - b. Feature Standardization
  - c. Label Encoding
  - d. One Hot Encoding
- 12. Perform following visualizations using matplotlib
  - a. Bar Graph
  - b. Pie Chart
  - c. Box Plot
  - d. Histogram
  - e. Line Chart and Subplots
  - f. Scatter Plot
- 13. Getting started with NLTK, install NLTK using PIP
- 14. Python program to implement with Python Sci Kit-Learn & NLTK
- 15. Python program to implement with Python NLTK/Spicy/Py NLPI.

### **TEXT BOOKS:**

1. Python for Data Science for Dummies, 2ed, Luca Massaron John Paul Mueller.

### **REFERENCE BOOKS:**

- 1. Python for Data Analysis Data Wrangling with Pandas, NumPy, and IPython, WesMcKinney
- Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson; 2 edition (January 26, 2003), ISBN 978-0201648652 3. Big Data: Principles and best practices of scalable real-time data systems, 1st Edition, Nathan Marz, James Warren, ISBN 978-1617290343

### **REFERENCE WEBSITE:**

- 1. https://realpython.com
- 2. <u>https://www.datacamp.com</u>
- 3. <u>https://towardsdatascience.com</u>
- 4. https://www.kaggle.com
- 5. <u>https://www.analyticsvidhya.com</u>
- 6. <u>https://www.coursera.org</u>
- 7. <u>https://www.edx.org</u>



## **COURSE OUTCOMES:**

On su	ccessful completion of the course, students will be able to	Pos
CO1	Understanding and Applying NumPy Basics	PO1
CO2	Implement Advanced Array Manipulations with NumPy	PO3
CO3	Understand and implement stacking and concatenating arrays.	PO5
CO4	Implement Data Manipulation and Analysis with Pandas	P06
CO5	Implement Read and manipulate various file formats including text	PO2
	files, CSV files, Excel files, and JSON files.	
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a	PO9
	group.	
CO8	Communicate verbally and in written form, the understanding	PO10
	aboutthe experiments.	
CO9	Continue updating their skill related to object oriented concepts and	P012
	implementing programs in future.	

### **CO-PO MAPPING:**

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-		-	-	-	-
CO5	-	-	-	-	-	-	-	-		-	-	-
CO6	-	-	-	-	-	-	-	3	-		-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	3	-	-	-	-	-	-	-	3	-	-
C09												3
CO	3	3	-	3	3	3	-	3	3	3	-	3

(Data Science)

#### II B.TECH - III SEMESTER 23CSE234 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB (Common to CSE, CSM, CAI, CSD)

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**PRE-REQUISITES:** A course on Introduction to Programming

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Practice object-oriented programming in the Java programming language
- 2. Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
- 3. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
- 4. Construct Threads, Event Handling, implement packages, Java FX GUI

#### **EXPERIMENTS COVERING THE TOPICS:**

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

#### LIST OF EXPERIMENTS:

#### EXERCISE - 1:

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  $ax^2+bx=0$ . Calculate the discriminate D and basing on value of D, describe the nature of root.

#### **EXERCISE - 2**

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

- b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c) Write a JAVA program using StringBuffer to delete, remove character.

#### EXERCISE - 3

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

b) Write a JAVA program implement method overloading.

- c) Write a JAVA program to implement constructor.
- d)Write a JAVA program to implement constructor overloading.

#### **EXERCISE - 4**

- 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

#### EXERCISE - 5

- a) Write a JAVA program give example for "super" keyword.
- b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
- c) Write a JAVA program that implements Runtime polymorphism

#### **EXERCISE - 6**

- a) Write a JAVA program that describes exception handling mechanism
- b) Write a JAVA program Illustrating Multiple catch clauses
- c) Write a JAVA program for creation of Java Built-in Exceptions
- d) Write a JAVA program for creation of User Defined Exception

#### EXERCISE - 7

a) 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)



- b) Write a program q
- c) Write a Program illustrating Daemon Threads.
- d) Write a JAVA program Producer Consumer Problem

#### EXERCISE - 8

- a) Write a JAVA program that import and use the user defined packages
- b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
- c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

#### EXERCISE – 9

a) Develop a java project to make an automated teller machine with users account and password, bank account, with that user are able to withdraw, deposit, and view their account balance.

#### **COURSE OUTCOMES:**

On su	ccessful completion of the course the student will be	POs related to COs
CO1	Acquire the Knowledge on structure and model of the Java programming language.	PO1
CO2	Analyze the complex examples using java programming language.	PO2
CO3	Design solutions for user requirements using software functionality.	PO3
CO4	Investigate on event handling concepts in developing the object oriented programming	PO4
CO5	Develop the data base connectivity to the Java application	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
C07	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	PO12

#### **REFERENCE BOOKS:**

- 1. P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.
- 2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007
- 3. Bruce Éckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.
- 4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.

#### **REFERENCE WEBSITE:**

https://java-iitd.vlabs.ac.in/ http://peterindia.net/JavaFiles.html

#### **CO-PO MAPPING:**

CO-PO	P01	PO2	PO3	P04	P05	P06	P07	P08	P09	P010	PO11	P012
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
<b>CO</b> *	3	3	3	3	3	-	-	3	3	3	-	3



(Data Science)

23CSE235

#### **II B.TECH - III SEMESTER PYTHON PROGRAMMING** (SKILL ENHANCEMENT COURSE) (Common to CSE, CSM, CAI, CSD)

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**PRE-REQUISITES:** A course on Introduction to Programming

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Introduce core programming concepts of Python programming language.
- 2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- 3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

#### UNTI-I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

#### SAMPLE EXPERIMENTS:

- Write a program to find the largest element among three Numbers. 1.
- Write a Program to display all prime numbers within an interval 2.
- Write a program to swap two numbers without using a temporary variable. 3.
- 4. Demonstrate the following Operators in Python with suitable examples.
- i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators
- 5. Write a program to add and multiply complex numbers
- Write a program to print multiplication table of a given number. 6.

### **UNIT-II:**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling thefunction, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, \*args and \*\*kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

#### SAMPLE EXPERIMENTS:

- 7. Write a program to define a function with multiple return values.
- 8. Write a program to define a function using default arguments.
- 9. Write a program to find the length of the string without using any library functions.
- 10. Write a program to check if the substring is present in a given string or not.
- 11. Write a program to perform the given operations on a list:
  - i. additionii. insertioniii. slicing
- 12. Write a program to perform any 5 built-in functions by taking any list.

#### UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.



Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

#### Sample Experiments:

- 13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
- 14. Write a program to count the number of vowels in a string (No control flow allowed).
- 15. Write a program to check if a given key exists in a dictionary or not.
- 16. Write a program to add a new key-value pair to an existing dictionary.
- 17. Write a program to sum all the items in a given dictionary.

#### UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules. Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

#### SAMPLE EXPERIMENTS:

- 18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
- 19. Python program to print each line of a file in reverse order.
- 20. Python program to compute the number of characters, words and lines in a file.
- 21. Write a program to create, display, append, insert and reverse the order of the items in the array.
- 22. Write a program to add, transpose and multiply two matrices.
- 23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

#### UNIT-V:

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

#### SAMPLE EXPERIMENTS:

- 24. Python program to check whether a JSON string contains complex object or not.
- 25. Python Program to demonstrate NumPy arrays creation using array () function.
- 26. Python program to demonstrate use of ndim, shape, size, dtype.
- 27. Python program to demonstrate basic slicing, integer and Boolean indexing.
- 28. Python program to find min, max, sum, cumulative sum of array
- 29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
  - a) Apply head () function to the pandas data frame
  - b) Perform various data selection operations on Data Frame
- 30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib



#### **COURSE OUTCOMES:**

On s be ab	uccessful completion of this course the students should ble to:	POs r	elated to	o COs
CO1	Learn various problem solving approaches and ability to identify an appropriate approach to solve the problem	PO1, PO5	PO2,	РОЗ,
CO2	Implement conditionals and loops to design the python programming	PO1, PO5	PO2,	РОЗ,
CO3	Implement lists, set, tuples and dictionaries to develop python program.	PO1, PO5	PO2,	РОЗ,
CO4	Able to modulate the given problem using structural approach of programming	PO1, PO5	PO2,	РОЗ,
CO5	Build Python Programs using packages to solve real-time problems.	PO1, F PO4,P	РО2, РО3 О5	3,
CO6	Follow the ethical principles in implementing the programs	P08		
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9		
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10		
CO9	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	PO12		

#### **REFERENCE BOOKS:**

- 1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
- 2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2<sup>nd</sup>Edition, Pearson, 2024
- 3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

#### **REFERENCE WEBSITE:**

- 1. https://www.coursera.org/learn/python-for-applied-data-science-ai
- 2. <u>https://www.coursera.org/learn/python?specialization=python#syllabus</u>

#### **CO-PO MAPPING:**

CO-PO	P01	PO2	<b>PO3</b>	P04	P05	P06	P07	P08	P09	P010	PO11	P012
CO1	3	3	3	-	2	-	-	-	-	-	-	-
CO2	3	3	3	-	2	-	-	-	-	-	-	-
CO3	3	3	3	-	2	-	-	-	-	-	-	-
CO4	3	3	3	-	2	-	-	-	-	-	-	-
CO5	3	3	3	3	2	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	2	-	-	3	3	3		3



#### 23CSD241

#### II B.Tech. - IV Semester STATISTICAL METHODS FOR DATA SCIENCE (CSD)

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#### **PRE-REQUISITES: A Course on Introduction to Data Science**

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Understand and distinguish between discrete and continuous random variables, and their probability density functions.
- 2. Explore properties and applications of Binomial, Poisson, and Normal distributions.
- 3. Define population, sample, parameter, and statistic, and understand characteristics of a good estimator.
- 4. Grasp the concepts of consistency, unbiasedness, and sufficiency in estimators.
- 5. Explain the importance of these concepts in statistical inference.

#### **UNIT I: BASIC CONCEPTS**

Random variables (discrete and continuous), probability density functions, properties, mathematical expectation. Probability distributions: Binomial, Poisson and Normal-their properties. Population, sample, parameter and statistic; characteristics of a good estimator; Consistency – Invariance property of Consistent estimator, Sufficient condition for consistency; Unbiasedness; Sufficiency.

#### **UNIT 2: POINT ESTIMATION**

Point Estimation- Estimator, Estimate, Methods of point estimation – Maximum likelihood method (the asymptotic properties of ML estimators are not included), Large sample properties of ML estimator (without proof)- applications, Method of moments, method of least squares, method of minimum chi-square and modified minimum chi-square-Asymptotic Maximum Likelihood Estimation and applications

#### **UNIT 3: INTERVAL ESTIMATION**

Confidence limits and confidence coefficient; Duality between acceptance region of a test and a confidence interval; Construction of confidence intervals for population proportion (small and large samples) and between two population proportions(large samples); Confidence intervals for mean and variance of a normal population; Difference between themean and ratio of two normal populations.

#### **UNIT 4: TESTING OF HYPOTHESES**

Types of errors, power of a test, most powerful tests; Neyman-Pearson Fundamental Lemma and its applications; Notion of Uniformly most powerful tests; Likelihood Ratio tests: Description and property of LR tests - Application to standard distributions.

#### **UNIT 5: SMALL SAMPLE TESTS**

Student's t-test, test for a population mean, equality of two population means, paired t-test, F-test for equality of two population variances, Chi-square test for goodness of fit and test for independence of attributes,  $\chi^2$  test for testing variance of a normal distribution.

#### Total Hours: 45

#### 16



#### **COURSE OUTCOMES:**

On su to	ccessful completion of the course, students will be able	Pos
C01	Understand the basic concepts of Statistics.	PO1, PO2, P03,
CO2	Analyze the data and draw conclusion about collection of data under study using Point estimation	PO1, PO2, P03,
CO3	Analyze data and draw conclusion about collection of data under study using Interval estimation.	P01, P02, P03, P04
CO4	Analyze to test various hypotheses included in theory and types of errors for large samples.	PO1, PO2, P03, PO4
C05	Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems.	PO1, PO2, P03, PO4

#### **TEXTBOOKS:**

- 1. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
- 2. Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference Testing of Hypotheses, Prentice Hall of India, 2014

#### **REFERENCE BOOKS:**

- 1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
- 2. S. Ross, a First Course in Probability, Pearson Education India, 2002.
- 3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
- 4. Robert V Hogg, Elliot A Tannis and Dale L.Zimmerman, Probability and Statistical Inference, 9th edition, Pearson publishers, 2013.

#### **RESOURCE WEBSITE**

- 1. <u>https://onlinecourses.nptel.ac.in/noc21\_ma74/preview</u>
- 2. <u>https://onlinecourses.nptel.ac.in/noc22\_mg31/preview</u>

CO\PO	P01	PO2	PO3	P04	P05	P06	P07	P08	PO9	P010	P011	P012
CO.1	3	3	3		-	-	-	-	-	-	-	-
CO.2	3	3	3		-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	3	3	3	2	-	I	-	I	I	-	-	-

#### **CO-PO MAPPING:**



23CSD242

# **II B. Tech IV Semester** DATA ENGINEERING (CSD)

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**PRE-REQUISITES:** A Course on Introduction to Data Science

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Explain basic concepts of Data Engineering
- 2. Discuss bout Data Engineering Life Cycle
- 3. How to design Good Data Architecture

#### UNIT-I

Introduction to Data Engineering: Definition, Data Engineering Life Cycle, Evolution of Data Engineer, Data Engineering Versus Data Science, Data Engineering Skills and Activities, Data Maturity, Data Maturity Model, Skills of a Data Engineer, Business Responsibilities, Technical Responsibilities, Data Engineers and Other Technical Roles.

#### **UNIT-II**

**Data Engineering Life Cycle:** Data Life Cycle Versus Data Engineering Life Cycle, Generation: Source System, Storage, Ingestion, Transformation, Serving Data.

Major undercurrents across the Data Engineering Life Cycle: Security, DataManagement, DataOps, Data Architecture, Orchestration, Software Engineering.

#### UNIT-III

Designing Good Data Architecture: EnterpriseArchitecture, Data Architecture, Principles of Good Data Architecture, Major Architecture Concepts.

**Data Generation in Source Systems:** Sources of Data, Files and Unstructured Data, APIs, Application Databases (OLTP), OLAP, Change Data Capture, Logs, Database Logs, CRUD, Source System Practical Details.

#### **UNIT-IV**

Storage: Raw Ingredients of Data Storage, Data Storage Systems, Data Engineering Storage Abstractions, Data warehouse, Data Lake, Data Lakehouse.

**Ingestion:** Data Ingestion, Key Engineering considerations for the Ingestion Phase, Batch Ingestion Considerations, Message and Stream Ingestion Considerations, Ways to Ingest Data

#### **UNIT-V**

Queries, Modeling and Transformation: Queries, Life of a Query, Query Optimizer, Queries on Streaming Data, Data Modelling, Modeling Streaming Data, Transformations, Streaming Transformations and Processing.

Serving Data for Analytics, Machine Learning and Reverse ETL: General Considerations for serving Data, Business Analytics, Operational Analytics, Embedded Analytics, Ways to serve data for analytics and ML, Reverse ETL.

**TOTAL HOURS:45** 

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#### COURSE OUTCOMES:

On su to	ccessful completion of the course, students will be able	Pos
CO1	Understand Data Engineering Life cycle	PO1, PO2, P03, PO4
CO2	Apply appropriate data modeling techniques for different types of data. (L3)	P01, P02, P03, P04
CO3	Evaluate and select appropriate technologies and frameworks for specific dataengineering tasks. (L5)	P01, P02, P03, P04
CO4	Implement data quality checks and governance processes to ensure data reliability andcompliance	PO1, PO2, P03, PO4
CO5	Understand Data Engineering Life cycle	P01, P02, P03, P04

#### **TEXTBOOKS:**

1. Joe Reis, Matt Housley, Fundamentals of Data Engineering, O'Reilly Media, Inc.,June 2022,ISBN: 9781098108304

#### **REFERENCE BOOKS:**

- 1. Paul Crickard , Data Engineering with Python, Packt Publishing, October 2020.
- 2. Ralph Kimball, Margy Ross, The Data Warehouse Toolkit: The Definitive Guide to Dimensional Modeling, Wiley, 3rd Edition, 2013
- 3. James Densmore, Data Pipelines Pocket Reference: Moving and Processing Data for Analytics, O'Reilly Media, 1st Edition, 2021

#### **CO-PO MAPPING**

CO\PO	P01	PO2	<b>PO3</b>	P04	P05	P06	P07	P08	PO9	P010	P011	P012
CO.1	3	2	2	2	-	-	-	-	-	-	-	-
CO.2	3	2	2	2	-	-	-	-	-	-	-	-
CO.3	3	2	2	2	-	-	-	-	-	-	-	-
CO.4	3	2	2	2	-	-	-	-	-	-	-	-
CO.5	3	2	2	2	-	-	-	-	-	-	-	-
<b>CO</b> *	3	2	2	2	-	-	-	-	-	-	-	-



23CSE242

#### II B.Tech. - IV Semester DATABASE MANGEMENT SYSTEM (Common to CSE, CSM, CAI, CSD)

#### PRE-REQUISITES: Nil

#### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. Discuss the basic Database concepts and the applications, data models and ER Model.
- 2. Understand the Relational database design principles
- 3. Master the basics of SQL and construct queries using SQL.
- 4. Understand the Normalization process in Database Management System.
- 5. Familiar with the basic issues of transaction processing and concurrency control.

# UNIT -1: INTRODUCTION TO DATABASE MANAGEMENT SYSTEM AND ENTITY RELATIONSHIP MODEL

Database system - Characteristics (Database Vs File System) - Database Users - Advantages of Database systems - Database applications - Brief introduction of different Data Models -Conceptsof Schema - Instance and data independence -Three tier schema architecture for data independence - Database system structure environment - Centralized and Client Server architecture for the database - Introduction to Entity Relationship Model - Representation of entities - Attributes - Entity set - Relationship - Relationship set - Constraints - Sub classes super class - Inheritance- Specialization -Generalization using ER Diagrams.

#### **UNIT -2: RELATIONAL MODEL**

Introduction to Relational model - Concepts of domain – Attribute – Tuple - Relation importance ofnull values - Constraints (Domain, Key constraints, integrity constraints) and their importance - Relational Algebra, Relational Calculus - BASIC SQL: Simple Database schema - Data Base Language - types- Table definitions (create, alter), different DML operations (insert, delete, update).

#### **UNIT -3: INTRODUCTION TO STRUCTURED QUERY LANGUAGE**

Basic SQL querying (select and project) using where clause arithmetic & logical operations -SQL functions(Date and Time, Numeric, String conversion) - Creating tables with relationship, Implementation of key and integrity constraints - Nested queries, sub queries, grouping, aggregation, ordering - Implementation of different types of Joins, view (updatable and nonupdatable) - Relational set operations.

#### **UNIT -4: NORMALIZATION**

Purpose of Normalization and schema refinement - Concept of functional dependency - normal forms based on functional dependency - Lossless join and dependency preserving decomposition (1NF, 2NF and 3 NF), concept of surrogate key - Boyce-Codd normal form(BCNF) - MVD - Fourth normal form(4NF) - Fifth Normal Form (5NF).

#### UNIT -5: TRANSACTION CONCEPT AND INDEXING CONCEPTS

Transaction State - ACID properties - Concurrent Executions – Serializability - Recoverability, Implementation of Isolation - Testing for Serializability - Lock based - Time stamp based optimistic - Concurrency protocols – Deadlocks - Failure Classification - Storage, Recovery and Atomicity - Recovery algorithm - Introduction to Indexing Techniques - B+ Trees, operations onB+Trees - Hash Based Indexing

#### **Total Hours: 45**

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#### **COURSE OUTCOMES:**

On su to	ccessful completion of the course, students will be able	Pos
C01	Demonstrate knowledge on Data models and Database Languages and Design Entity Relationship model for a database	PO1, PO3
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries	PO1, PO2
CO3	Analyze and evaluate the database using SQL DML/DDL	PO1, PO2, PO3, PO5
CO4	Analyze databases using normal forms to provide solutions for real time applications	PO1, PO2
CO5	Understand the properties of transactions in a database system, analyze serializability and indexing techniques.	PO1, PO3,PO4

#### **TEXT BOOKS:**

- 1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
- 2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

#### **REFERENCE BOOKS:**

- 1. Introduction to Database Systems, 8thedition, C J Date, Pearson.
- 2. Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson
- 3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

#### **REFERENCE WEBSITE:**

- 1. https://www.w3schools.in/sql/database-concepts
- 2. https://www.javatpoint.com/dbms-tutorial
- https://www.geeksforgeeks.org/introduction-of-dbms-database-management-systemset-1/
- 4. https://nptel.ac.in/courses/106/105/106105175/
- 5. https://infyspringboard.onwingspan.com/web/en/app/toc/lex\_auth\_0127580666728202 2456\_shared/overview

CO/PO	P01	PO2	<b>PO3</b>	P04	P05	P06	P07	P08	PO9	PO10	P011	PO12
CO.1	3	-	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	3	3	-	3	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	2	3	-	-	-	-	-	-	-	-
<b>CO</b> *	3	3	2.6	3	3	-	-	-	-	-	-	-
	CO\PO CO.1 CO.2 CO.3 CO.4 CO.5 CO*	CO\PO         PO1           CO.1         3           CO.2         3           CO.3         3           CO.4         3           CO.5         3           CO*         3	CO\PO         PO1         PO2           CO.1         3         -           CO.2         3         3           CO.3         3         3           CO.4         3         3           CO.5         3         -           CO*         3         3	CO\PO         PO1         PO2         PO3           CO.1         3         -         3           CO.2         3         3         -           CO.3         3         3         3           CO.4         3         3         -           CO.5         3         -         2           CO*         3         3         -	CO\PO         PO1         PO2         PO3         PO4           CO.1         3          3            CO.2         3         3             CO.3         3         3         3            CO.4         3         3         3            CO.5         3         -         2         3           CO.5         3         -         2         3           CO.5         3         -         2         3	CO\PO         PO1         PO2         PO3         PO4         PO5           CO.1         3          3             CO.2         3         3              CO.3         3         3              CO.4         3         3         3             CO.5         3          2         3            CO.5         3          2.6         3	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6           CO.1         3         -         3         -         -         -           CO.2         3         3         -         -         -         -           CO.2         3         3         -         -         -         -           CO.3         3         3         -         -         -         -           CO.4         3         3         -         -         -         -           CO.4         3         3         -         -         -         -           CO.5         3         -         2         3         -         -           CO.5         3         -         2.6         3         -         -	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7           CO.1         3         -         3         -         5         -         -         -           CO.2         3         3         -         -         -         -         -           CO.3         3         3         -         -         -         -         -           CO.4         3         3         -         -         -         -         -           CO.4         3         3         -         -         -         -         -           CO.5         3         -         2         3         -         -         -           CO.5         3         -         2         3         -         -         -           CO*         3         3         2         6         3         -         -         -	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8           CO.1         3          3	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9           CO.1         3          3	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10           CO.1         3          3	CO\PO         PO1         PO2         PO3         PO4         PO5         PO6         PO7         PO8         PO9         PO10         PO11           CO.PO         3          3

#### **CO-PO MAPPING:**

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (Autonomous) DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

#### (Data Science) II B.Tech- IV Semester DATA ENGINEERING LAB (CSD)

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#### **COURSE OBJECTIVE:**

23CSD343

• The main objective of this course is to teach how build data engineering infrastructure and data pipelines.

#### **EXPERIMENTS:**

- 1. Installing and configuring Apache NiFi, Apache Airflow
- 2. Installing and configuring Elasticsearch, Kibana, PostgreSQL, pgAdmin 4
- 3. Reading and Writing files
  - a. Reading and writing files in Python
  - b. Processing files in Airflow
  - c. NiFi processors for handling files
  - d. Reading and writing data to databases in Python
  - e. Databases in Airflow
  - f. Database processors in NiFi
- 4. Working with Databases
  - a. Inserting and extracting relational data in Python
  - b. Inserting and extracting NoSQL database data in Python
  - c. Building database pipelines in Airflow
  - d. Building database pipelines in NiFi
- 5. Cleaning, Transforming and Enriching Data
  - a. Performing exploratory data analysis in Python
  - b. Handling common data issues using pandas
  - c. Cleaning data using Airflow
- 6. Building the Data Pipeline
- 7. Building a Kibana Dash Board
- 8. Perform the following operations
  - a. Staging and validating data
  - b. Building idempotent data pipelines
  - c. Building atomic data pipelines
- 9. Version Control with the NiFi Registry
  - a. Installing and configuring the NiFi Registry
  - b. Using the Registry in NiFi
  - c. Versioning your data pipelines
  - d. Using git-persistence with the NiFi Registry
- 10. Monitoring Data Pipelines
  - a. Monitoring NiFi in the GUI
  - b. Monitoring NiFi using processors
  - c. Monitoring NiFi with Python and the REST API
  - d. Deploying Data PipelinesFinalizing your data pipelines for production
  - e. Using the NiFi variable registry
  - f. Deploying your data pipelines
- 11. Building a Production Data Pipeline
  - a. Creating a test and production environment
  - b. Building a production data pipeline

# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (Autonomous) DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Data Science)

 $c. \quad \text{Deploying a data pipeline in production} \\$ 

#### COURSE OUTCOMES:

On the	On the successful completion of this course, the student should be able to,					
CO1	Design and implement end-to-end data pipelines using technologies such as Apache Spark, Kafka, or similar frameworks.	PO1				
CO2	Create and manage relational and NoSQL databases (e.g., MySQL, PostgreSQL, MongoDB) for storing and querying structured and unstructured data.	PO2				
СО3	Develop Extract, Transform, Load (ETL) processes to integrate data from multiple sources into a unified format suitable for analysis and reporting.	PO3				
CO4	Implement data quality checks and validation mechanisms to ensure accuracy, completeness, and consistency of data within pipelines and databases.	PO4				
CO5	Deploy and manage data engineering solutions on cloud platforms (e.g., AWS, Azure, Google Cloud) for scalability and reliability.	P05				
CO6	Identify performance bottlenecks in data pipelines and databases, and apply optimization techniques to enhance throughput and efficiency.	P06				
C07	Do experiments effectively as an individual and as a teammember in a group.	P07				
CO8	Communicate verbally and in written form, the understandingabout the experiments.	P08				
CO9	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	P09				

#### **REFERENCE BOOKS:**

1. Paul Crickard , Data Engineering with Python, Packt Publishing, October

#### **CO-PO MAPPING**

СО-РО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	-	3	-	-	3	3	3	-	3



(Data Science)

#### 23CSE245

# II B.Tech. - IV Semester DATABASE MANAGEMENT SYSTEMS LAB L T P C

(Common to CSE, CSM, CAI, CSD) 3 0 0 3

#### PRE-REQUISITES: Nil

#### **COURSE EDUCATIONAL OBJECTIVES:**

This Course will enable students to

- 1. Populate and query a database using SQL DDL/DML Commands
- 2. Declare and enforce integrity constraints on a database
- 3. Writing Queries using advanced concepts of SQL
- 4. Programming PL/SQL including procedures, functions, cursors and triggers

#### **EXPERIMENTS COVERING THE TOPICS:**

- 1. DDL, DML, DCL commands
- 2. Queries, nested queries, built-in functions,
- 3. PL/SQL programming- control structures
- 4. Procedures, Functions, Cursors, Triggers,
- 5. Database connectivity- ODBC/JDBC

#### **EXPERIMENTS**:

1. Creation, altering and droping 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, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVINGand Creation and dropping of Views.

4. Queries using Conversion functions (to\_char, to\_number and to\_date), string functions (Concatenation, Ipad, rpad, Itrim, rtrim, Iower, upper, initcap, length, substr and instr), date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc,round, to\_char, to\_date)

5. i. Create a simple PL/SQL program which includes declaration section, executable section



#### (Data Science)

and exception -Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records werefound)

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

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. Theprogram can be extended using the NULLIF and COALESCE functions.

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE1APPLICATION ERROR.

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

12. Create a table and perform the search operation on table using indexing and non1indexingtechniques.

- 13. Write a Java program that connects to a database using JDBC
- 14. Write a Java program to connect to a database using JDBC and insert values into it
- 15. Write a Java program to connect to a database using JDBC and delete values from it

#### **REFERENCE BOOKS:**

- 1. Oracle: The Complete Reference by Oracle Press
- 2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
- 3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007
- 4. Ramez Elmasri, Shamkant, B. Navathe," Database Systems,", Pearson Education, 6<sup>th</sup> Edition, 2013.
- 5. Database Principles Fundamentals of Design Implementation and Management,10<sup>th</sup> edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning,2022



#### **REFERENCE WEBSITE:**

- 1. https://www.scoopworld.in
- 2. https://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

# **COURSE OUTCOMES:**

0	n successful completion of the course the student will be	POs
CO1	Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.	PO1
CO2	Analyze the database schemas for the different types of database	PO2
СО3	Design the databases using SQL DML/DDL Commands	PO3
CO4	Design the complex PL/SQL programs for different problems	PO4
CO5	Use the procedure, function, trigger and cursor concepts in PL/SQL	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
C07	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to SQL Commands and Queries and implementing programs in future.	PO12

#### **CO PO MAPPING:**

CO-PO	P01	PO2	PO3	P04	P05	P06	P07	P08	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
CO8	-	-	-	-	-	-	-	-	-	3	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
<b>CO</b> *	3	3	3	3	3	-	-	3	3	3	-	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (Autonomous) DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(Data Science)



23CSD344

#### II B.Tech. - II Semester EXPLORATORY DATA ANALYSIS WITH PYTHON (CSD)

L T P C 0 1 2 2

**PRE-REQUISITES:** A course on Introduction to Data science and Python Programming

### **COURSE EDUCATIONAL OBJECTIVES:**

- 1. This course introduces the fundamentals of Exploratory Data Analysis
- 2. It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods

#### UNIT I:

**Exploratory Data Analysis Fundamentals:** Understanding data science, The significance of EDA, Steps in EDA, Making sense of data, Numerical data, Categorical data, Measurement scales, Comparing EDA with classical and Bayesian analysis, Software tools available for EDA, Getting started with EDA.

#### Sample Experiments:

- 1. a) Download Dataset from Kaggle using the following link :
  - <u>https://www.kaggle.com/datasets/sukhmanibedi/cars4u</u>
    b) Install python libraries required for Exploratory Data Analysis (numpy, pandas, matplotlib,seaborn)
- 2. Perform Numpy Array basic operations and Explore Numpy Built-in functions.
- 3. Loading Dataset into pandas dataframe
- 4. Selecting rows and columns in the dataframe

### **UNIT 2:**

**Visual Aids for EDA:** Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart

**Case Study:**EDA with Personal Email, Technical requirements, Loading the dataset, Data transformation, Data cleansing, Applying descriptive statistics, Data refactoring, Data analysis. **Sample Experiments:** 

- 5. Apply different visualization techniques using sample dataset
  - a) Line Chart b) Bar Chart c) Scatter Plots d)Bubble Plot
- 6. Generate Scatter Plot using seaborn library for iris dataset
- 7. Apply following visualization Techniques for a sample dataset
- a) Area Plot b) Stacked Plot c) Pie chart d) Table Chart
- 8. Generate the following charts for a dataset.
  - a) Polar Chart b)Histogram c)Lollipop chart
- 9. Case Study: Perform Exploratory Data Analysis with Personal Email Data

#### **UNIT 3:**

**Data Transformation:** Merging database-style dataframes, Concatenating along with an axis, Merging on index, Reshaping and pivoting, Transformation techniques, Handling missing data, Mathematical operations with NaN, Filling missing values, Discretization and binning, Outlier detection and filtering, Permutation and random sampling, Benefits of data transformation, Challenges.

#### Sample Experiments:

- 10. Perform the following operations
  - a) Merging Dataframes
  - b) Reshaping with Hierarchical Indexing
  - c) Data Deduplication
  - d) Replacing Values
- 11. Apply different Missing Data handling techniques
- a)NaN values in mathematical Operations
  - b) Filling in missing data
  - c) Forward and Backward filling of missing values

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(Data Science)

- d) Filling with index values
- e) Interpolation of missing values

12. Apply different data transformation techniques

- a) Renaming axis indexes
- b)Discretization and Binning
  - c) Permutation and Random Sampling
  - d) Dummy variables

### **UNIT 4:**

Descriptive Statistics: Distribution function, Measures of central tendency, Measures of dispersion, Types of kurtosis, Calculating percentiles, Quartiles, Grouping Datasets, Correlation, Understanding univariate, bivariate, multivariate analysis, Time Series Analysis Sample Experiments:

- 13. Study the following Distribution Techniques on a sample data
  - a) Uniform Distribution
- b) Normal Distribution
- c) Gamma Distribution
- d) Exponential Distribution
  - e) Poisson Distribution
  - f) Binomial Distribution
- 14. Perform Data Cleaning on a sample dataset.
- 15. Compute measure of Central Tendency on a sample dataset
  - a) Mean b)Median c)Mode
- 16. Explore Measures of Dispersion on a sample dataset
- a) Variance b) Standard Deviation c) Skewness d) Kurtosis
- 17. a) Calculating percentiles on sample dataset
  - b) Calculate Inter Quartile Range(IQR) and Visualize using Box Plots
- 18. Perform the following analysis on automobile dataset.
  - a) Bivariate analysis b)Multivariate analysis
- 19. Perform Time Series Analysis on Open Power systems dataset

### **UNIT 5:**

Model Development and Evaluation: Unified machine learning workflow, Data preprocessing, Data preparation, Training sets and corpus creation, Model creation and training, Modelevaluation, Best model selection and evaluation, Model deployment

Case Study: EDA on Wine Quality Data Analysis

#### Sample Experiments:

20. Perform hypothesis testing using statsmodels library

a) Z-Test b)T-Test

21. Develop model and Perform Model Evaluation using different metrics such as prediction score, R2 Score, MAE Score, MSE Score.

22. Case Study: Perform Exploratory Data Analysis with Wine Quality Dataset

#### **COURSE OUTCOMES:** On successful completion of the course, students will be able to Pos Define the concepts related to design thinking. (L1, L2) **PO1 CO1 PO3** Explain the fundamentals of Design Thinking and innovation **CO2** (L1, L2) **PO5** Apply the design thinking techniques for solving problems **CO3** in various sectors. (L3) **PO6** Analyse to work in a multidisciplinary environment (L4) **CO4**

CO5	Evaluate the value of creativity (L5)	PO2
CO6	Formulate specific problem statements of real time issues (L3, L6)	PO8
C07	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding aboutthe experiments.	PO10
CO9	Continue updating their skill related to object oriented concepts and implementing programs in future.	P012

#### **TEXTBOOK:**

1. Suresh Kumar Mukhiya, Usman Ahmed, Hands-On Exploratory Data Analysis withPython,Packt Publishing, 2020.

#### **REFERENCES:**

- 1. Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press, 2020
- RadhikaDatar, HarishGarg, Hands-On Exploratory Data Analysis with R: Become an expertin exploratory data analysis using R packages, Ist Edition, Packt Publishing, 2019

#### **REFERENCE WEBSITE**

- 1. <u>https://github.com/PacktPublishing/Hands-on-Exploratory-Data-Analysis-</u> <u>with-Python</u>
- 2. <u>https://www.analyticsvidhya.com/blog/2022/07/step-by-step-exploratory-data-analysis-eda-using-python/#h-conclusion</u>
- 3. <u>https://github.com/PacktPublishing/Exploratory-Data-Analysis-with-Python-Cookbook</u>

CO\PO	P01	PO2	<b>PO3</b>	P04	P05	P06	P07	P08	PO9	PO10	P011	P012
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-		-	-	-	-
CO5	-	-	-	-	-	-	-	-		-	-	-
CO6	-	-	-	-	I	-	I	3	-		-	-
C07	-	-	-	-	-	-	-	-	3	-	-	-
C08	-	3	I	I	I	I	I	-	-	3	-	-
CO9												3
<b>CO</b> *	3	3	-	3	3	3	-	3	3	3	-	3

#### **CO-PO MAPPING:**

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUA, Ananthapuramu)

# ACADEMIC CALENDAR (2024 - 2025)

DATE: 03.07.2024

# **IV YEAR B.TECH, VII SEMESTER**

Commencement of Class Works	29.07.2024	
Instruction Period for the Semester	29.07.2024 to 23.11.2024	17 weeks
Exam	inations	
I Mid-Term Examinations	17.09.2024 to 21.09.2024	1 week
II Mid-Term Examinations	25.11.2024 to 30.11.2024	1 week
Semester End Practical Examinations	02.12.2024 to 07.12.2024	1 week
Semester End Theory Examinations	09.12.2024 to 21.12.2024	2 weeks
Commencement of Class Work For VIII Semester	23.12.2024	

### **IV YEAR B.TECH, VIII SEMESTER**

Commencement of Class Works	23.12.2024		
Internship and Project Work	23.12.2024 to 19.04.2025	17 weeks	
Exa	minations		
First Review	06.01.2025 to 11.01.2025	1 week	
Second Review	10.02.2025 to 15.02.2025	1 week	
Third Review	17.03.2025 to 22.03.2025	1 week	
External Project Viva-Voce	21.04.2025 to 26.04.2025	1 week	

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# ACADEMIC CALENDAR (2024 - 2025)

DATE: 03.07.2024

# **III YEAR B.TECH, V SEMESTER**

Commencement of Class Works	29.07.2024	
Instruction Period for the Semester	29.07.2024 to 23.11.2024	17 weeks
Exam	inations	
I Mid-Term Examinations	23.09.2024 to 28.09.2024	1 week
II Mid-Term Examinations	25.11.2024 to 30.11.2024	1 week
Semester End Practical Examinations	02.12.2024 to 07.12.2024	1 week
Semester End Theory Examinations	09.12.2024 to 21.12.2024	2 weeks
Commencement of Class Work For VI Semester	23.12.2024	

#### **III YEAR B.TECH, VI SEMESTER**

Commencement of Class Works	23.12.2024	·	
Instruction Period for the Semester	23.12.2024 to 19.04.2025	17 weeks	
Exam	inations		
I Mid-Term Examinations	17.02.2025 to 22.02.2025	1 week	
II Mid-Term Examinations	21.04.2025 to 26.04.2025	1 week	
Semester End Practical Examinations	28.04.2025 to 03.05.2025	1 week	
Semester End Theory Examinations	05.05.2025 to 17.05.2025	2 weeks	
Industry Internship	19.05.2024 to 12.07.2025	8 weeks	
Commencement of Class Work For VII Semester	14.07.2025		

Jan 217/24 Dean (Academics)

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(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUA, Ananthapuramu)

# ACADEMIC CALENDAR (2024 - 2025)

DATE: 03.07.2024

#### **II YEAR B.TECH, III SEMESTER**

<b>Commencement of Class Works</b>	29.07.2024	
Instruction Period for the Semester	29.07.2024 to 23.11.2024	17 weeks
Exam	inations	
I Mid-Term Examinations	23.09.2024 to 28.09.2024	1 week
II Mid-Term Examinations	25.11.2024 to 30.11.2024	1 week
Semester End Practical Examinations	02.12.2024 to 07.12.2024	1 week
Semester End Theory Examinations	09.12.2024 to 21.12.2024	2 weeks
Commencement of Class Work For IV Semester	23.12.2024	

# **II YEAR B.TECH, IV SEMESTER**

Commencement of Class Works	23.12.2024			
Instruction Period for the Semester	23.12.2024 to 19.04.2025	17 weeks		
Exam	inations			
I Mid-Term Examinations	17.02.2025 to 22.02.2025	1 week		
II Mid-Term Examinations	21.04.2025 to 26.04.2025			
Semester End Practical Examinations	28.04.2025 to 03.05.2025	1 week		
Semester End Theory Examinations	05.05.2025 to 17.05.2025	2 weeks		
<b>Community Service Project</b>	19.05.2024 to 12.07.2025	8 weeks		
Commencement of Class Work For V Semester	14.07.2025	-		

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# ACADEMIC CALENDAR (2024 - 2025)

DATE: 03.07.2024

# II YEAR M.TECH, III SEMESTER

Commencement of Project Work (Phase-I)	k (Phase-I) 29.07.2024		
Project Work (Phase-I)	29.07.2024 to 23.11.2024	17 weeks	
Examin	ations		
First Review	19.08.2024 to 24.08.2024	1 week 1 week 1 week	
Second Review	23.09.2024 to 28.09.2024		
Third Review	21.10.2024 to 26.10.2024		
External Project Viva-Voce	25.11.2024 to 07.12.2024	2 weeks	
Commencement of Project Work For IV Semester	16.12.2024		

# **II YEAR M.TECH, IV SEMESTER**

Commencement of Project Work (Phase-II)	16.12.2024		
Project Work (Phase-II)	23.12.2024 to 12.04.2025	17 weeks	
Examin	ations		
First Review	06.01.2025 to 11.01.2025	1 week	
Second Review	10.02.2025 to 15.02.2025	1 week	
Third Review	Third Review 17.03.2025 to 22.03.2025		
External Project Viva-Voce	14.04.2025 to 26.04.2025	2 weeks	

Coules 3/3/24 Dean (Academics)

PRINCIPA



# SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES- CHITTOOR -517127 (AUTONOMOUS) Accredited by NBA Approved by AICTE, New Delhi, Affiliated to JNTUA, Ananthapuramu

ESTD: 1998

# PANEL OF QUESTION PAPER SETTERS AND EXAMINERS - ACADEMIC YEAR - 2024-2025

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (Data Science)

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**BOS** Chairman

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Principal 210

PRINCIPAL Sreenivasa Institute of Technology and Management Studies-GHITTOOR 517 127

Page 9 of 9

9. Dr K.Madhavi informed to include Board of Studies members in the panel of question paper setters and examiners list

-The suggestion is accepted and included in the Panel list

The board has suggested chairman of BoS-CSE(Data Science) to make the necessary changes and corrections in R23 B.Tech curriculum by discussing with curriculum development cell (CDC) members.

The meeting was concluded with a vote of thanks by Mr.A.Srinivasan BOS Chairman.

S.No	Name of the member	Designation	Signature
1	Mr A Srinivasan	Associate Professor & HOD-CSE(DS) SITAMS, Chittoor	ANY
2	Dr K Madhavi	<b>Professor &amp; Coordinator,</b> Future Skills & Incubation Centre JNT University Anantapur	k. Hadhay
3	Dr D Venkatesh	Associate Professor GITAM University Bengalore.	online
4	Dr Syed Muzamil Basha	Associate Professor, REVA University, Bengalore	Online
5	Mr S.Dhanesh	Sr Data Engineer, Walmart Bengalore	Online
6	Mr Omkar Rayapeddi,	Engineering Manager, NetAPP INC Bengalore	Online
7	Mr M.E Palanivel	Professor & Head of CSE, SITAMS, Chittoor	ONE
8	Dr. R. Munipraveena	Associate Professor & HOD-CSE(AI) SITAMS, Chittoor	Kauco
9	Mr. E. Purusotham,	Associate Professor of CSE, SITAMS, Chittoor	8. Ewen
10	Mr G Yuvaraju	Assistant Professor of CSE-DS, SITAMS, Chittoor	9 yrs

Mr A Srinivasan **BOS** Chairman

9. Dr K.Madhavi informed to include Board of Studies members in the panel of question paper setters and examiners list

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The board has suggested chairman of BoS-CSE(Data Science) to make the necessary changes and corrections in R23 B.Tech curriculum by discussing with curriculum development cell (CDC) members.

The meeting was concluded with a vote of thanks by Mr.A.Srinivasan BOS Chairman.

S.No	Name of the member	Designation	Signature
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2	Dr K Madhavi	<b>Professor &amp; Coordinator,</b> Future Skills & Incubation Centre JNT University Anantapur	online
3	Dr D Venkatesh	Associate Professor GITAM University Bengalore.	Bart
4	Dr Syed Muzamil Basha	Associate Professor, REVA University, Bengalore	Online
5	Mr S.Dhanesh	Sr Data Engineer, Walmart Bengalore	pulane
6	Mr Omkar Rayapeddi,	Engineering Manager, NetAPP INC Bengalore	Online
7	Mr M.E Palanivel	Professor & Head of CSE, SITAMS, Chittoor	ANE
8	Dr. R. Munipraveena	Associate Professor & HOD-CSE(AI) SITAMS, Chittoor	Ranco
9	Mr. E. Purusotham,	Associate Professor of CSE, SITAMS, Chittoor	E. Ewen
10	Mr G Yuvaraju	Assistant Professor of CSE-DS, SITAMS, Chittoor	q. ym

Mr A Srinivasan **BOS** Chairman

SITAMS - BOS - CSE(Data Science)-Approval Request-Reg - hodds@sitams.org - SITAMS Mail

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Chat	Starred		h	hodds datascience		Tu	e, Jul 🤇	9, 10:31/	AM (1 day	ago)	
	Snoozed		V	Dear sir Greetings of the day I bring to your kind notice that SITAMS- CSE-Data Science departi	ment 4th BOS meeting was	held on 06-07-2024 w	th all	your su	iggesti		
Meet	Sent			Dr. Sved Muzamil hasha		11:27 AM	(2 hou	irs ago)			
	Drafts	12	D	to me		11-277 (14)	,2 1100	io ugo)			
	More			Respected Sir,							
	Labels			All the points addressed in the meeting is recorded and well documented in the MON taken care. Consider this email communication as approval from my side.	И. The response for all th	ie suggestions given	by th	າe BOS	membe	rs are	

Thank you and Regards,

Dr. Syed Muzamil Basha (MIEEE Senior, LT-ISTE, LT-IOASD)

Research Vertical Head | Professor | School of Computer Science and Engineering

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REVA UNIVERSITY | Rukmini Knowledge Park | Kattigenahalli | Yelahanka | Bengaluru | Karnataka 560 064



SITAMS - BOS - CSE(Data Science)-Approval Request-Reg - hodds@sitams.org - SITAMS Mail

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			Thank you for your support. With Regards Mr A.Srinivasan., M.Tech, MCSI, MISTE, Associate Professor & HOD-CSE-DS, Sreenivasa Institute of Technology and Management Studies Chittoor - 517127 Mobile No: 8008370525								
			INSTITUTE VISION To emerge as a Center of Excellence for Learning and Research in the domains INSTITUTE MISSION IM1: Provide congenial academic ambience with state-of-art resources for lea IM2: Ignite the students to acquire self-reliance in the latest technologies. IM3: Unleash and encourage the innate potential and creativity of students. IM4: Inculcate confidence to face and experience new challenges.	of Engineering, Computing and Management.							

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