

**SRI VENKATESWARA UNIVERSITY**  
**BCA (Data Science) Honours– W.E.F. 2024-25**

<b>Year</b>	<b>Semester</b>	<b>Course</b>	<b>Title of the Course</b>	<b>No. of Hrs /Week</b>	<b>No. of Credits</b>
II	III	5	Database Management	3	3
			Database Management System Lab	2	1
		6	Mathematical Foundation	3	3
			Mathematical Foundation Lab	2	1
		7	JAVA and Data Structure	3	3
			JAVA and Data Structure Lab	2	1
		8	Introduction to Data Science and R programming	3	3
			Introduction to Data Science and R programming Lab	2	1

**Note: Course 5, 6, and 7 are common to all BCA specializations**

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE 5: DATA BASE MANAGEMENT SYSTEM**

**Theory**

**Credits: 3**

**3 hrs/week**

**Course Objectives:**

- Graduates will have the expertise in analyzing real time problems and providing appropriate solutions related to Computer Science & Engineering.
- Graduates will have the knowledge of fundamental principles and innovative technologies to succeed in higher studies and research.
- Graduates will continue to learn and to adapt technology developments combined with deep awareness of ethical responsibilities in profession.

**Course Outcomes:**

- An ability to apply Knowledge of computing and mathematics in Computer Science & Engineering.
- An ability to analyze a problem, identify and define the computing requirements appropriate to its solution.
- An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations.
- An ability to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering.
- An ability to engage in continuing professional development and life-long learning.

**UNIT-I**

**Overview of Database Systems: Introduction:** Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications.

**Data Models:** Introduction; types of data models, Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence;

**Case Study:**

1. Describe the differences between Database systems and File based systems
2. Study about data base models and their advantages and disadvantages

**UNIT-II**

**Relational Model:** Introduction to relational model, Codd's rules, concepts of domain, attribute, tuple, relation, constraints (Domain, Key constraints, integrity constraints) and their importance, concept of keys (super key, candidate key, primary key, foreign key).

**Normalization:** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency (1NF, 2NF,

and 3NF), Boyce-codd normal form (BCNF)

**Case Study:** Describe Relational model and normalization for database design

### **UNIT-III:**

**Entity Relationship Model:** Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, subclasses, superclass, inheritance, specialization, generalization using ERDiagrams.

**BASIC SQL:** Database schema, datatypes, DDL operations (create, alter, drop, rename), DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, aggregation, grouping, ordering.

#### **Case Study:**

1. Examine issues in data storage and query processing using SQL.
2. Create, maintain and manipulate a relational database using SQL

### **UNIT-IV**

**SQL:** Nested queries / subqueries, implementation of different types of joins, SQL functions (Date, Numeric, String, Conversion functions), Creating tables with relationship, implementation of key and integrity constraints, views, relational set operations, Transaction Control Language :commit, Rollback, Savepoint, DCL: Grant, Revoke

#### **Case Study:**

1. Try to convert some sample data to information and show how it can be used in decision making.

### **UNIT-V**

**PL/SQL:** Introduction, PL/SQL program Structure, Data types, Control Structures, Cursors, Procedure, Function, Exception Handling, Triggers, Packages.

#### **Case Study:**

1. Study about Triggers and their usages.

## **Text Books**

- Database Management Systems, 3<sup>rd</sup> Edition , Raghurama Krishnan, Johannes Gehrke, TMH
- Database System Concepts, 5<sup>th</sup> Edition ,Silberschatz, Korth, TMH

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**COURSE 5: DATABASE MANAGEMENT SYSTEM**

**PRACTICALS**

**Credits: 1**

**2 hrs/week**

**List of Experiments**

**SQL:**

**Cycle-I:** Aim: Marketing company wishes to computerize their operations by using following tables.

Table Name: Client-Master

Description: Used to store client information

Column Name	Data Type	Size	Attribute
			Primary key
CLIENT_NO	Varchar2	6	
NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESSSS	Varchar2	30	
CITY	Varchar2	15	
PINCODE	Varchar2	8	
STATE	Varchar2	15	
BAL_DUE	Number	10,2	

Table Name: Product\_Master

Description: Used to store product information

ColumnName	Data Type	Size	Attribute
			Primary key
PRODUCT_NO	Varchar2	6	
DESCRIPTION	Varchar2	15	Not null
PROFIT_PERCENT	Number	4,2	Not null
UNIT_MEASURE	Varchar2	10	
QTY_ON_HAND	Number	8	
REORDER_LVL	Number	8	
SELL_PRICE	Number	8,2	Not null cannot be 0
COST_PRICE	Number	8,2	Not null cannot be 0

Table Name: Salesman\_master

Description: Used to store salesman information working for the company.

ColumnName	Data Type	Size	Attribute
SALESMAN_NO	Varchar2	6	Primarykey
SALESMAN_NAME	Varchar2	20	Not null
ADDRESS1	Varchar2	30	
ADDRESS2	Varchar2	30	
CITY	Varchar2	20	
PINCODE	Number	8	
STATE	Vachar2	20	
SAL_AMT	Number	8.2	Not null cannotbe0
TGT_TO_GET	Number	6.2	Not null cannotbe0
YTD_SALES	Number	6.2	Not null
REMARKS	Varchar2	20	

Table Name: SALES- ORDER

Description: Used to store client's orders

ColumnName	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primarykey
CLIENT_NO	Varchar2	6	ForeignKey
ORDER_DATE	Date		
DELY_ADDRESS	Varchar2	25	
SALESMAN_NO	Varchar2	6	ForeignKey
DELY_TYPE	Char	1	Delivery:part(n)/full(f)anddefault'F'
BILL_YN	Char	1	
DELY_DATE	Date		Can'tbelessthanorderdate
ORDER_STATUS	Varchar2	10	Values("InProgress","Fulfilled", "Back Order","Cancelled.

Table Name: SALES\_ORDER\_DETAILS

Description : Used to store client's order with details of each product ordered.

ColumnName	Data Type	Size	Attribute
ORDER_NO	Varchar2	6	Primarykey references
PRODUCT_NO	Varchar2	6	Foreign Key references
QTY_ORDERED	Number	8	
QTY_DISP	Number	8	
PRODUCT_RATE	Number	10.2	ForeignKey

Solve the following queries by using above tables.

1. Retrieve the list of names, city and the state of all the clients.
2. List all the clients who are located in 'Mumbai' or 'Bangalore'.
3. List the various products available from the product\_master table.
4. Find the names of salesman who have a salary equal to Rs.3000.
5. List the names of all clients having 'a' as the second letter in their names.
6. List all clients whose balance is greater than value 1000.
7. List the clients who stay in a city whose first letter is 'M'.
8. List all information from sales-order table for orders placed in the month of July.
9. List the products whose selling price is greater than 1000 and less than or equal to 3000.
10. Find the products whose selling price is greater than 1000 and also find the new selling price as original selling price 0.50.

### Cycle-II Supplier

Aim: A manufacturing company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows.

Supplier (Supplier\_No, Sname, City, status) Part (Part\_no, pname, color, weight, city, cost) Shipment (supplier\_No, Part\_no, city) JX (project\_no, project\_name, city) SPJX (Supplier\_no, part\_no, project\_no, city)

1. Get supplier numbers and status for suppliers in Chennai with status > 20.
2. Get project names for projects supplied by supplier 'S'.
3. Get colors of parts supplied by supplier 'S'.
4. Get part numbers for parts supplied to any project in Mumbai.
5. Find the id's of suppliers who supply red or pink parts.

### **Cycle-III EmployeeDatabase**

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into a certain departments and each department consists of employees. The following two tables describes the automation schemas.

Emp(Empno, Ename, Job, Mgr, Hiredate, Sal, Comm, Deptno) Dept(Deptno, Dname, Loc)

1. List the details of employees who have joined before the end of September '81.
2. List the name of the employee and designation of the employee, who does not report to anybody.
3. List the name, salary and PF amount of all the employees (PF is calculated as 10% of salary)
4. List the names of employees who are more than 2 years old in the organization.
5. Determine the number of employees, who are taking commission.
6. Update the employee salary by 20%, whose experience is greater than 12 years.
7. Determine the department does not contain any employees.
8. Create a view, which contains employee name and their manager names working in sales department.
9. Determine the employees, whose total salary is like the minimum salary of any department.
10. List the department numbers and number of employees in each department.

### **PL/SQLPROGRAMS**

1. Write a PL/SQL program to check the given string is palindrome or not.
2. The HRD manager has decide to raise the employee salary by 15% write a PL/SQL block to accept the employee number and update the salary of that employee. Display appropriate message based on the existence of the record in Emp table.
3. Write a PL/SQL program to display top 10 rows in Emp table based on their job and salary.
4. Write a PL/SQL program to raise the employee salary by 10% for department number 30 people and also maintain the raised details in the raise table.
5. Create a procedure to update the salaries of Employees by 20%, for those who are not getting commission
6. Write a PL/SQL procedure to prepare an electricity bill by using following table. Table used: Elect

Name	Null?	Type
MNNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)



SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

7. Create a trigger to avoid any transactions (insert, update, delete) on EMP table on Saturday & Sunday.

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE 5: DATABASE MANAGEMENT SYSTEM**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

1. Short answer question from Unit-1
2. Short answer question from Unit-1
3. Short answer question from Unit-2
4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Long answer question from Unit-1
12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE6: MATHEMATICAL FOUNDATION**

**Theory**

**Credits: 3**

**3 hrs/week**

**Learning Outcomes:** After successful completion of this course, the student will be able to;

1. Have an idea about basic mathematical techniques which are necessary to analyze the statically technique.
2. Able to know the concept of matrices and its operations.
3. Able to complete the adjoint and determinate of a square matrix, hence it's inverse.
4. Capable of solving the simultaneous equations using matrix method.
5. Understands the differentiation, integration and its applications.

**UNIT-I**

**Matrix Algebra-I:** Introduction-Definition of Matrix-Variety types of Matrices- Addition of Matrices-Subtraction of Matrices-Multiplication of Matrices and their applications. Transpose of a Matrix-Symmetric Matrix-Skew Symmetric Matrix Orthogonal Matrix-Singular Matrix-Non Singular Matrix.

**UNIT-II**

**Matrix Algebra-II:** Determinant of a Matrix- Adjoint of a Square Matrix - Inverse of a Matrix upto 3 order only, Rank of a Matrix.

**Solutions of Linear equations:** 1. Matrix inversion method 2. Cramer's Rule upto 3 order only

**UNIT-III**

**Limits & Continuity:** Limit at point, properties of limit, continuity at a point, continuity over an interval, Types of discontinuities.

**Differentiation:** Derivatives of sum, differences, product & quotient, Chain Rule, Differentiation, Rolle's Theorem, Mean Value Theorem, Expansion of functions (Maclaurin's & Taylor's), Indeterminate Forms, L. Hospitals Rule.

#### **UNIT-IV:**

##### **Finite Difference and Interpolation:**

Finite Differences - Forward Differences -Backward differences.

Newton's forward interpolation formula - Newton's backward interpolation formula.

#### **UNIT-V**

**Set Theory:** Definition of Set – Types of Sets - Union of Sets - Intersection of Sets - Venn diagrams – Operations on Sets – Complement of Set - Distributive Laws- De Morgan's Laws.

#### **Note:**

1. Concentration on numerical problems only.
2. Proofs of theorems and Derivations of expressions are omitted.

#### **References**

##### **Text Books:**

1. Mathematical Methods by Dr. T.K.V. Ivengar, Dr. B.Krishna Gandhi, Dr. S. Ranganatham, and Dr.M.V.S.S.N. Prasad by S.Chand publications 6th revised edition 2011.
2. Quantitative Techniques by C. Satyadevi by S.chand Company

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**COURSE6: Mathematical Foundation**

**PRACTICALS**

**Credits: 1**

**2 hrs/week**

List of Lab Experiments implementation using any programming language

1. Addition, Subtraction of Matrices.
2. Multiplication of Matrices.
3. Determinant of a Matrix and Inverse of a Matrix.
4. Singular and Non-Singular Matrices.
5. Cramer's Rule and Matrix Inversion Method.
6. Rank of a Matrix.
7. Applications of Forward Difference & Applications of Backward Difference
8. Problem on Union.
9. Problem on Intersection.

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE 6: MATHEMATICAL FOUNDATIONS**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

1. Short answer question from Unit-1
2. Short answer question from Unit-1
3. Short answer question from Unit-2
4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Long answer question from Unit-1
12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE7:JAVA AND DATA STRUCTURES**

**Theory** **Credits: 3** **3 hrs/week**

**Course Objectives:**

To make the students understand the fundamentals of Java programming and organize and manage data, based on data structures for efficient access.

- To expose the students to Concepts of OOP and JAVA
- To make the students to design appropriate Exception Handling in Java
- Identifying various data structures and their real-time applications
- Implementing different sorting & searching techniques

**Course Outcomes:**

The student would become competent enough to write, debug, and document well-structured java applications

- Demonstrate good object-oriented programming skills in Java
- Able to describe recognize, apply, and implement selected design patterns in Java
- Understand the capabilities and limitations of Java
- Be familiar with common errors in Java and its associated libraries
- Develop excellent debugging skills

**UNIT-I**

**Introduction to OOPS:** Paradigms of Programming Languages – Basic concepts of Object Oriented Programming– Benefits of OOPs – Application of OOPs, History and Evolution of Java–Java features – Java Environment. Introduction to Java: Creating and Executing a Java program– Java Tokens– Data Types - Variables–Scope of variables–Type casting– Operators– control statements – arrays

**Case Study:**

Study the evolution of JAVA, why it was developed, and how it changed the software industry scenario.

Study the difference between the looping structured in JAVA and Programming in C.

## UNIT - II

**Class and objects:** Defining a class–Methods–Creating objects–Accessing class members– Overloading methods – Constructors.

**Inheritance:** Defining inheritance–types of inheritance–Method overloading–Static members–this keyword–Overriding methods–Final variables and methods.

**Interfaces:** Defining interface–Extending interface – Implementing Interface

### Case Study:

Study the limitation of Constructors in JAVA.

Study the inheritance types available in JAVA and try to identify the limitations

## UNIT-III

**Packages:** Java API Packages–Defining a Package, System Packages–Naming Conventions– Creating & Package Member Access

**Exception Handling:** Types of Errors –Basics of Exception Handling–Advantages of Exception Handling – Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement

**Applets:** Introduction, Java applications versus Java Applets, Applet Life-cycle

### Case Study:

Study the advantages of Package compared to Libraries in Procedural languages

## UNIT-IV

**Data structure:** Introduction and Overview- Elementary Data Organization, Data Structures classification, Data Structure Operations.

Arrays – Sorting(bubble, selection, insertion, and quick) – Searching(linear and Binary)

**Linear Data Structures:** Linked Lists, Stacks and Queues, Implementation using arrays and Linked List

### Case Study:

Linked list verses Arrays.

Application of Stacks, Queues.



## **UNIT-V**

**Trees** – Basic Terminology - applications of trees - Binary trees, Representing and traversing binary trees, Binary Search Trees.

**Graphs**– Terminology – applications of graphs, Sequential representation of Graphs, Linked representation of Graphs, Operations on Graphs, Traversing a Graph.

### **Case Study:**

Applications of Trees and Graphs

### **TEXTBOOKS:**

1. **Object Oriented Programming through Java**, Universities Press, by P. Radha Krishna.
2. E. Balagurusamy, “*Programming with Java*”, TataMc-GrawHill, 5<sup>th</sup> Edition.
3. Data Structures by Seymour Lipschutz, McGrawHill (Schaum’s Outlines).
4. Data Structures using C, Second edition, Dr. Reema Thareja, Oxford University Press.

### **REFERENCES:**

- Herbert Schildt, “The complete reference Java”, TataMc-GrawHill, 7th Edition.
- Theory and Problems of Data Structures by Seymour Lipschutz, McGraw Hill (Schaum’s Outlines)

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(w.e.f. 2024-25)**

**COURSE7: JAVA AND DATA STRUCTURES**

---

**Practicals** **Credits: 1** **2 hrs/week**

**List of Lab Experiments**

1. Write a program to print Biggest of 3 Numbers using Logical Operators.
2. Write a program to Test the Prime number.
3. Write a program to create a Simple class to find out the Area and perimeter of rectangle and box using super and this keyword.
4. Write a program to design a class account using the inheritance and static that's how all function of bank (withdrawal, deposit).
5. Write a program to handle the exception using try and multiple catch block.
6. Write a program to implement stack using arrays.
7. Write a program to implement queue using arrays.
8. Write a program to implement Sorting
9. Write a program to implement searching
10. Write a program to implement tree traversals
11. Write a program to implement binary search trees
12. Write a program to traversing a graph.

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**Common to all BCA Honours**

**General/Data Science/Big Data/Artificial Intelligence/Cloud Computing**

**II Year III Semester**

**(W.E.F. 2024-25)**

**COURSE 7: JAVA AND DATA STRUCTURE**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

1. Short answer question from Unit-1
2. Short answer question from Unit-1
3. Short answer question from Unit-2
4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Long answer question from Unit-1
12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**

**BCA (DATA SCIENCE) (MAJOR)**

**SEMESTER-III**

**(W.E.F. 2024-25)**

**COURSE 8: INTRODUCTION TO DATA SCIENCE & 'R' PROGRAMMING**

**Theory**

**Credits: 3**

**3 hrs/week**

---

**Course objectives:**

1. To understand the overview and definition of Data Science with its crucial role in current business world.
2. To understand the role of machine learning techniques in Data Science and its different types.
3. To know the integrated role of computers and its components in Data Science
4. To understand the flow and process model of data science project management.

**UNIT-I**

**Data Science – Overview:** Introduction to Data Science, Definition and description, history and development, terminologies, basic framework and architecture, difference between Data Science and business analytics, importance of Data Science, primary components of Data Science, users of Data Science and its hierarchy, overview of Data Science techniques, challenges and opportunities in Data Science, industrial application of Data Science techniques.

**UNIT- II**

**Machine Learning in Data Science:** Role of machine learning, different types of machine learning techniques and its broad scope: Supervised, unsupervised, reinforcement and deep learning, importance of machine learning in today's business, difference between classification and prediction.  
**Role of relation data base systems:** SQL, NoSQL, data warehousing, freely available software tools: R, Python, important proprietary software tools, business intelligence tools.

**UNIT- III**

**Data Science Project Management:** Data Science project framework, execution flow of a Data Science project, various components of Data Science projects, stakeholders of Data Science project, industry use cases of Data Science implementation, challenges and scope of Data Science project management, process evaluation model, comparison of Data Science project methods.

## UNIT-IV

**Introduction to R :** What is R? Why R? advantages of R over other programming languages, Data types in R-logical, numeric, integer, character, double, complex, raw, ls() command, expressions, variables, control structures, Array, Matrix, Vectors.

Lists & Data frames: Lists, Constructing and modifying lists, concatenating lists, data frame access, ordering data frames, R functions for data frames dim(), nrow(), ncol(), str(), summary(), names(), head(), tail(), edit(). Load data frames—reading from .CSV files, reading from tab separated value files, reading from tables.

## UNIT-V

**Functions:** Writing your own functions, Named arguments and defaults. The '...' argument.

**Graphical Procedures:** High Level Plotting Commands, Low Level Plotting Commands, Interacting with graphics, using graphics parameters, Graphics Parameters list.

### Text Books:

1. Data Science from Scratch: First Principles with Python 1st Edition by Joel Grus
2. Principles of Data Science by Sinan Ozdemir, (2016) PACKT.
3. An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**BCA (DATA SCIENCE) (MAJOR)**  
**SEMESTER-III**  
**(w.e.f. 2024-25)**

**COURSE 8: INTRODUCTION TO DATA SCIENCE & 'R' PROGRAMMING**

**PRACTICALS**

**Credits: 1**

**2 hrs/week**

List of Lab Experiments

1. Create a vector in R and perform operations on it.
2. Create integer, complex, logical, character data type objects in R and print their values and their class using print and class functions.
3. Write code in R to demonstrate sum(), min(), max() and seq() functions.
4. Write code in R to manipulate text in R using grep(), toupper(), tolower() and substr() functions.
5. Create data frame in R and perform operations on it.
6. Import data into R from text and excel files using read.table () and read.csv () functions.
7. Write code in R to find out whether number is prime or not.
8. Print numbers from 1 to 100 using while loop and for loop in R.
9. Write a program to import data from csv file and print the data on the console.

**SRI VENKATESWARA UNIVERSITY::TIRUPATI**  
**BCA (DATA SCIENCE) (MAJOR)**

**SEMESTER-III**

**(W.E.F. 2024-25)**

**COURSE 8: INTRODUCTION TO DATA SCIENCE & 'R' PROGRAMMING**

**Time : 3 Hrs**

**Max Marks : 75**

**SECTION - A**

**Answer any Five of the following**

**5 X 3= 15 Marks**

1. Short answer question from Unit-1
2. Short answer question from Unit-1
3. Short answer question from Unit-2
4. Short answer question from Unit-2
5. Short answer question from Unit-3
6. Short answer question from Unit-3
7. Short answer question from Unit-4
8. Short answer question from Unit-4
9. Short answer question from Unit-5
10. Short answer question from Unit-5

**SECTION - B**

**Answer any Five of the following**

**5 X 12= 60 Marks**

11. Long answer question from Unit-1
12. Long answer question from Unit-1
13. Long answer question from Unit-2
14. Long answer question from Unit-2
15. Long answer question from Unit-3
16. Long answer question from Unit-3
17. Long answer question from Unit-4
18. Long answer question from Unit-4
19. Long answer question from Unit-5
20. Long answer question from Unit-5