SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road-517583

QUESTION BANK(DESCRIPTIVE)

Subject with Code: R Programming for Data Science(20CS1104)	**Year & Sem:** III & II
Course & Branch: B.Tech & CAD	**Regulation:** R20

UNIT – I

INTRODUCTION TO R PROGRAMMING

1		What is R? Briefly describe the history and development of the R programming language.	[L2][CO1]	[12M]
2	a)	Explain the different ways to run R code, including using the R console, R scripts, and R Markdown.	[L2][CO1]	[6M]
	b)	Classify the advantages and disadvantages of each method for running R code.	[L4][CO1]	[6M]
3	a)	What are R sessions, and how do you manage them effectively?	[L2][CO1]	[6M]
	b)	Illustrate the concept of functions in R with a program, and how to define and use them?	[L3][CO1]	[6M]
4	a)	Demonstrate basic math operations with program, such as addition, subtraction, multiplication, and division.	[L2][CO1]	[6M]
	b)	Categorize the order of operations in R and how to use parentheses to control the evaluation of expressions with an example program.	[L4][CO1]	[6M]
5	a)	Illustrate how to declare and assign values to variables in R with a program?	[L3][CO1]	[6M]
	b)	Discuss the different naming conventions and rules for variable naming, each with example in R.	[L2][CO1]	[6M]
6	a)	Classify different data types in R with example.	[L4][CO1]	[6M]
	b)	Conclude how to check the data type of a variable and convert between different data types.	[L4][CO1]	[6M]
7		Classify different data structures in R with examples.	[L4][CO1]	[12M]
8	a)	i)Create a program for manipulating data frames in R. ii)Create a program for manipulating lists in R.	[L6][CO1]	[6M]
	b)	Determine Vector and its functions with examples.	[L3][CO1]	[6M]
9	a)	Differentiate between matrices and data frames?	[L4][CO1]	[6M]
	b)	Create a program for 2x3 matrix and accessing its second row?	[L6][CO1]	[6M]
10	a)	Discriminate the following data structures with syntax and example. i)Arrays ii)Matrices	[L5][CO1]	[6M]
	b)	Demonstrate how to create, manipulate, and perform operations on these data structures. i)Lists ii)Data Frames	[L2][CO1]	[6M]

UNIT – II

R PROGRAMMING STRUCTURES, OPERATORS AND FUNCTIONS

1		Illustrate different conditional statements in R with appropriate syntax and examples.	[L3][CO2]	[12M]
2	a)	Explain working of switch case in R with an example program.	[L2][CO2]	[6M]
	b)	Develop a R program to check for leap year or not.	[L6][CO2]	[6M]
3	a)	Illustrate for loop in R and demonstrate its usage.	[L3][CO2]	[6M]
	b)	Explain the while loop and create a program for finding the sum of natural numbers.	[L6][CO2]	[6M]
4	a)	Describe how to iterate over a list or a data frame using a loop.	[L2][CO2]	[6M]
	b)	Explain the lapply and sapply functions and their use cases and create a program that uses lapply to apply a function to each element of a list and returns a new list.	[L6][CO2]	[6M]
5	a)	Compare the functions next and break with example program.	[L5][CO2]	[6M]
	b)	Explain the concept of nested if-else statements and prepare an example that uses the ifelse() function to create a new vector based on conditions.	[L6][CO2]	[6M]
6	a)	Classify various types of operators in R and write about any two operators.	[L4][CO2]	[6M]
	b)	Write a program that demonstrates the use of various arithmetic and Boolean operators.	[L2][CO2]	[6M]
7	a)	Explain how to set default values for function arguments in R.	[L2][CO2]	[6M]
	b)	Justify the importance of default values and their use cases and create a function that takes two arguments with default values and returns their sum.	[6][CO2]	[6M]
8	a)	Describe the return() function in R and its purpose.	[L2][CO2]	[6M]
	b)	Illustrate the concept of implicit return in R functions.	[L3][CO2]	[6M]
9	a)	Discuss the factors to consider when deciding whether to use an explicit return () statement.	[L2][CO2]	[6M]
	b)	Explain how to return complex objects, such as lists or data frames, from R functions.	[L1][CO2]	[6M]
10	a)	Illustrate the concept of functions being first-class citizens in R.	[L3][CO2]	[6M]
	b)	Discuss the absence of pointers in R. create a recursive function that calculates the nth Fibonacci number.	[L6][CO2]	[6M]

UNIT – III

MATH FUNCTIONS, SIMULATION IN R AND EXTENDED EXAMPLE

CALCULATING PROBABILITY

1		Identify different built-in mathematical functions in R with for example for each	[L3][CO3]	[12M]
2	a)	Categorize the different methods for calculating minimum, maximum, and cumulative sum statistics on vectors in R.	[L4][CO3]	[6M]
	b)	Differentiate between cumulative sums and products in the context of numerical analysis within R.	[L4][CO3]	[6M]
3	a)	Create a R program for calculating the probability.	[L6][CO3]	[6M]
	b)	Explain following functions with example i)dnorm ii)qchisq iii)qbinom iv)rnorm	[L2][CO3]	[6M]
4		Evaluate the capabilities of R for performing basic calculus operations (e.g., differentiation, integration).	[L5][CO3]	[12M]
5		Explain efficient techniques for sorting data vectors in R based on specific **criteria.**	[L2][CO3]	[12M]
6	a)	Classify fundamental linear algebra operations on vectors and matrices in R, including addition, subtraction, and scalar **multiplication.**	[L4][CO3]	[6M]
	b)	Prioritize an example (excluding vector cross product) of how vector operations are used in linear algebra applications within R.	[L4][CO3]	[6M]
7		Demonstrate the vector cross product and its applications in R.	[L2][CO3]	[12M]
8	a)	Distinguish Markov chains and their significance in modeling probabilistic systems.	[L4][CO3]	[6M]
	b)	Illustrate how to import data in R programming.	[L3][CO3]	[6M]
9	a)	Classify set operations (union, intersection, difference) and their implementation for data manipulation in R.	[L4][CO3]	[6M]
	b)	Explain reading and writing files in R.	[L2][CO3]	[6M]
10	a)	What is the purpose of getwd() and setwd() functions in R	[L4][CO3]	[6M]
	b)	Explain the purpose of the following functions in R: i. read.csv() ii. write.csv() iii. read.xlsx()	[L2][CO3]	[6M]

UNIT-4

GRAPHICS

1	a)	Describe the role of the plot() function in R base **graphics.**	[L2][CO4]	[6M]
	b)	What are the essential components required to create a graph using the plot() **function?**	[L6][CO4]	[6M]
2	a)	How do you customize the appearance of a graph using the plot() function **in R?**	[L2][CO4]	[6M]
	b)	Illustrate the concept of data visualization and its importance in data analysis.	[L3][CO4]	[6M]
3	a)	Discuss the advantages of using R base graphics for creating graphs.	[L2][CO4]	[6M]
	b)	Categorize some common types of graphs that can be created using the plot() function.	[L4][CO4]	[6M]
4	a)	How do you add labels to the axes of a graph created with the plot() function?	[L2][CO4]	[6M]
	b)	Describe the process of changing the color and line type of a plot in R.	[L2][CO4]	[6M]
5	a)	Explain the significance of customizing the title of a graph in data visualization.	[L2][CO4]	[6M]
	b)	Assess the use of the main parameter in the plot() function for adding a title to a graph.	[L5][CO4]	[6M]
6	a)	Illustrate Data visualization with R and ggplot2.	[L3][CO4]	[6M]
	b)	Identify the different options available for adjusting the size and aspect ratio of a graph in R.	[L3][CO4]	[6M]
7	a)	Outline the process of saving a graph created with the plot() function to a file in R.	[L2][CO4]	[6M]
	b)	Discover the purpose of the file parameter in the plot() function for saving graphs.	[L3][CO4]	[6M]
8	a)	List and explain about different R – Charts and Graphs in R.	[L2][CO4]	[6M]
	b)	Discriminate the importance of choosing an appropriate file format when saving a graph in R.	[L5][CO4]	[6M]
9	a)	How do you specify the dimensions and resolution of a saved graph in R?	[L2][CO4]	[6M]
	b)	Describe the process of exporting a graph to different file formats using the plot() function.	[L2][CO4]	[6M]
10		Develop a code to demonstrate various charts using tree datasets for the following a. Histogram b. Scatter plot c. Box plot d. Line chart	[L3][CO4]	[12M]

UNIT-5

PROBABILITY DISTRIBUTIONS AND LINEAR REGRESSION

1	**a)**	Classify the characteristics of the normal distribution and provide an example of its application in real-world data analysis.	[L4][CO5]	[6M]
	b)	Identify the properties of the binomial distribution and give an example of its use.	[L3][CO5]	[6M]
2	**a)**	What are the key features of the Poisson distribution, and when is it commonly used.	[L1][CO5]	[3M]
	b)	Discuss about standard deviation with example.	[L2][CO5]	[7M]
3	**a)**	Determine basic statistics and explain their importance in data analysis?	[L3][CO5]	[6M]
	b)	Illustrate the concepts of correlation and covariance and explain how they are calculated.	[L3][CO5]	[6M]
4	**a)**	Analyze the purpose of T-tests in statistical analysis and provide examples of when they are used.	[L4][CO5]	[6M]
	b)	Distinguish the use of ANOVA (Analysis of Variance) in comparing means across multiple groups.	[L5][CO5]	[6M]
5	**a)**	Examine the concept of linear models and give an example of simple linear regression.	[L4][CO5]	[6M]
	b)	Describe the process of multiple regression and its applications.	[L2][CO5]	[6M]
6	**a)**	Discuss generalized linear models and their advantages over traditional linear models.	[L6][CO5]	[6M]
	b)	Explain the logistic regression model and provide an example of its use.	[L2][CO5]	[6M]

7 Apply the regression models: [L3][CO5] [12M]

height	176	154	138	196	132	176	181	169	150	175
bodymass	82	49	53	112	47	69	77	71	62	78

For the above data:
•Perform linear regression and display the result.
•Create a Regression plot with the following specifications.
•Display the title of the graph as "Height Vs. Bodymass"
•Set the color of the plot as blue

8	**a)**	Assess the Poisson regression model and its application in analyzing count data.	[L5][CO6]	[6M]
	b)	Summarize advantages of using Random Forest.	[L2][CO6]	[6M]
9	**a)**	Explain the structure of decision tree.	[L2][CO6]	[6M]
	b)	Categorize the principles behind decision trees and their application in random forests.	[L4][CO6]	[6M]
10	**a)**	Discuss the advantages of random forests over traditional statistical models.	[L2][CO6]	[6M]
	b)	Give examples of real-world scenarios where random forests are used for predictive modeling.	[L2][CO6]	[6M]

Prepared by:
A SATHISH