

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024
 Third Semester
Electronics and Communication Engineering
20ECPW301 - R PROGRAMMING WITH LABORATORY
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. What is R primarily used for? (a) Web development (b) Game design (c) Statistical computing and data analysis (d) Video editing	1	K1	CO1
2. Which of the following is NOT an advanced data structure in R? (a) Data Frame (b) List (c) Function (d) Array	1	K1	CO1
3. What function can be used to check the class of an object in R? (a) typeof() (b) class() (c) str() (d) is.class()	1	K1	CO1
4. Which of the following is NOT a basic data structure in R programming? (a) Data Frame (b) Array (c) Linked List (d) Vector	1	K1	CO2
5. Which of the following operators is used for logical AND in R? (a) && (b) & (c) and (d)	1	K1	CO2
6. Why doesn't R have pointers like other languages such as C? (a) R automatically manages memory, so pointers are not needed (b) Pointers are too complex for R's user-friendly approach (c) R does not support complex data structures (d) R uses references instead of pointers	1	K2	CO2
7. Which R function would you use to calculate the square root of a number? (a) sqrt() (b) abs() (c) log() (d) exp()	1	K1	CO3
8. Which of the following functions is used to sort a vector in ascending order in R? (a) sort() (b) order() (c) arrange() (d) rank()	1	K1	CO3
9. Which of the following functions is used to find the intersection of two sets (vectors) in R? (a) intersect() (b) union() (c) setdiff() (d) setequal()	1	K1	CO3
10. Which of the following is the main package for basic graphics in R? (a) ggplot2 (b) plotly (c) graphics (d) lattice	1	K1	CO4
11. Which function in R is referred to as the "workhorse" of base graphics for creating most types of plots? (a) hist() (b) plot() (c) barplot() (d) boxplot()	1	K1	CO4
12. Which argument in the plot () function is used to change the plotting symbol or character for points in a plot? (a) symbol (b) pch (c) marker (d) pointType	1	K1	CO4
13. Which of the following is the main goal of classification in machine learning? (a) To group similar data points into clusters (b) To predict a continuous output variable (c) To assign input data into predefined categories or classes (d) To reinforce actions based on rewards	1	K1	CO5

14. Which of the following best describes Machine Learning? 1 K1 CO5
 (a) Machine learning is a process where computers are explicitly programmed to perform tasks
 (b) Machine learning is a subset of artificial intelligence that enables systems to learn from data and improve over time without being explicitly programmed
 (c) Machine learning only involves supervised learning techniques
 (d) Machine learning only applies to classification problems
15. Which of the following machine learning algorithms is commonly used for classification tasks? 1 K1 CO5
 (a) Support Vector Machines (SVM) (b) K-Means Clustering
 (c) Principal Component Analysis (PCA) (d) Linear Regression
16. In fraud detection in banking, which machine learning approach would most likely be used to identify unusual transaction patterns in a customer's account? 1 K2 CO5
 (a) K-Means Clustering (Unsupervised Learning)
 (b) Linear Regression (Supervised Learning)
 (c) Decision Trees (Supervised Learning)
 (d) Q-Learning (Reinforcement Learning)
17. Which of the following distributions is commonly used to model the number of successes in a fixed number of independent Bernoulli trials? 1 K1 CO6
 (a) Poisson Distribution (b) Normal Distribution
 (c) Binomial Distribution (d) Exponential Distribution
18. The Poisson distribution is typically used to model which of the following? 1 K1 CO6
 (a) The time between events in a process that occurs at a constant average rate
 (b) The number of successes in a fixed number of trials
 (c) The heights of individuals in a population
 (d) The correlation between two variables
19. In a one-sample t-test, the null hypothesis generally assumes that: 1 K1 CO6
 (a) The population mean is greater than the sample mean
 (b) The population mean is equal to the sample mean
 (c) The sample variance is equal to the population variance
 (d) The sample mean is greater than the population mean
20. Survival analysis is used to: 1 K1 CO6
 (a) Model the probability of an event occurring over time
 (b) Analyze how much time passes between two events
 (c) Predict the distribution of continuous outcomes
 (d) Perform classification on survival data

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. Write an R program to add 3 to each element in a given vector. Print the original and new vector. 2 K2 CO1
22. Study the following R codes 2 K2 CO1
`a = 1 : 12`
`b = -13 : -24`
`A = matrix(a, ncol = 4, byrow = T)`
`B = matrix(b, nrow = 3, byrow = F)`
`C = A+B`
`D = t(C)`
`E = A[2,4]+B[3,4]`
`F = cbind(A,B)`
 From the above codes write the value of A, B, C, D, E and F.
23. What is the output of `seq(4)` and `seq(from=2, to=10, by =2)`? 2 K2 CO2
24. Write about next and break in R programming. 2 K2 CO2

25. Distinguish between `max()` and `pmax()` functions. 2 K2 CO3
26. Describe the purpose of the `steadyStates()` function in the `markovchain` package in R. 2 K2 CO3
27. What functions are used to create graphics in R? 2 K1 CO4
28. State the important features of `ggplot2` in R. 2 K1 CO4
29. Give the expression for the pdf of Normal distribution function. 2 K1 CO5
30. How is correlation and covariance done in R? 2 K2 CO6

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) Compare and contrast the use of functions and scripts in R. How does the execution of a function differ from running a script, and when would you prefer one over the other? 10 K2 CO1

OR

- b) Illustrate how to create a list and demonstrate all the ways of accessing a list component. 10 K2 CO1

32. a) Explain with examples the different control statements in R. 10 K2 CO2

OR

- b) Write the R code to perform the Binary search of the data in a given vector. 10 K2 CO2

33. a) You need to sort a dataset with 1 million data points. You have the option of using R's `sort()` function or writing your own sorting algorithm (e.g., QuickSort or MergeSort). Write an R code to perform the Quicksort and comment on the two sorting techniques. 10 K3 CO3

OR

- b) Write an R program to generate the dataframe and read and write the dataframe. 10 K3 CO3

S.No	Name	Department	No. of Winning Project	Prize Amount
1	A	ECE	7	Rs.25000
2	B	AI&DS	3	Rs.6000
3	C	CSE	8	Rs.36000
4	D	IT	2	Rs.4000
5	E	ECE	5	Rs.12000
6	F	AI&DS	5	Rs.10000

34. a) A researcher is examining the iris dataset to understand how different species of iris flowers vary in petal length and petal width. Using Lattice Graphics in R, write code to create a scatter plot showing the relationship between Petal Length and Petal Width, with separate panels for each species (Species). Customize your plot to include titles for each panel indicating the species name, and add meaningful axis labels. 10 K2 CO4

Id	Sepal Length in Cm	Sepal Width in Cm	Petal Length in Cm	Petal Width in Cm	Species
1	5.1	3.5	1.4	0.2	Iris-setosa
2	4.9	3.0	1.4	0.2	Iris-setosa
3	4.7	3.2	1.3	0.2	Iris-setosa
4	4.6	3.1	1.5	0.2	Iris-setosa
5	5.0	3.6	1.4	0.2	Iris-setosa

OR

- b) With the data set of your own choice generate the Pie chart and Histogram plot using ggplot2. Apply the different variations that can be done in the plots. 10 K2 CO4
35. a) Explain in detail what happens during the model training process in supervised learning. Write an R code to perform the prediction of the species using Iris data set. 10 K2 CO5
- OR**
- b) Discuss briefly about the key components of a reinforcement learning problem. How do these components relate to an agent's decision-making process in a typical reinforcement learning task in R? 10 K2 CO5
36. a) Differentiate between T test and ANOVA test. Apply the hypothetical testing using T test and write the R code for the same. 10 K3 CO6
- OR**
- b) Using the different functions generate the density and cumulative distribution for the Binomial and Poisson distribution function. 10 K3 CO6