

EXPT NO:1	
DATE: 06.01.2026	

Implementation of data charts

PRE-LAB QUESTIONS (PROVIDE BRIEF ANSWERS TO THE FOLLOWING QUESTIONS)

1. How can visualization help an academic institution improve student outcomes? Ans:
Visualization helps identify weak subjects and performance trends, enabling timely academic support and improved teaching strategies.

2. Which chart types are suitable for comparing subject-wise performance?
Ans: Bar charts and column charts are suitable for comparing subject-wise performance.

3. What type of data scale is used for student marks?
Ans: Student marks use a **ratio scale** because they have a true zero and equal intervals.

4. Why should raw academic data be cleaned before visualization?
Ans: Data cleaning removes errors and missing values, ensuring accurate and meaningful visual analysis.

5. How does visualization support evidence-based decision making?
Ans: Visualization presents data clearly, helping administrators make decisions based on actual performance patterns.

IN-LAB EXERCISE:

OBJECTIVE:

To design appropriate data charts to analyze and compare academic performance indicators.

SCENARIO:

An autonomous engineering college wants to analyze internal assessment performance of firstyear students across five subjects to identify difficult courses and improve teaching strategies.

IN-LAB TASKS (Using R Language)

- Load required R libraries (ggplot2, dplyr)
- Import dataset using read.csv()
- Perform basic data preprocessing
- Create bar chart for subject-wise average marks
- Generate line chart for performance trend across tests
- Plot pie chart for grade distribution

SCREENSHOT OF CODE

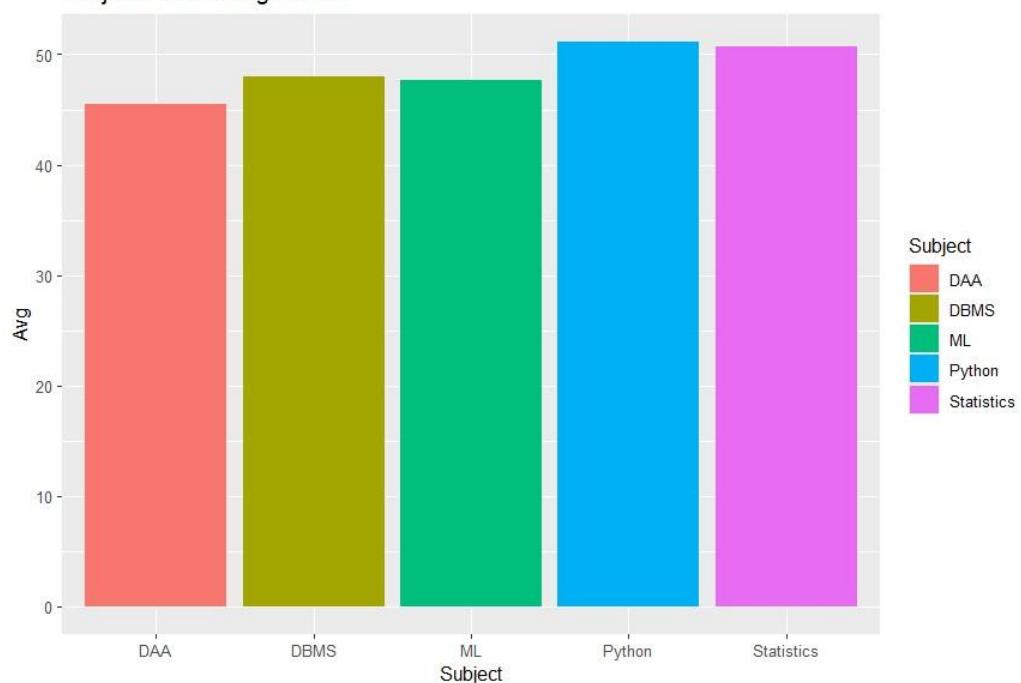
The screenshot shows an RStudio interface with the following details:

- Title Bar:** Untitled1*
- Toolbar:** Includes icons for file operations, source control, and a "Run" button.
- Code Area:** Contains R code for data manipulation and plotting. The code uses ggplot2, dplyr, and tidyverse packages to calculate average internal marks, create bar charts for subject-wise average marks, line charts for performance trends across tests, and pie charts for grade distribution.

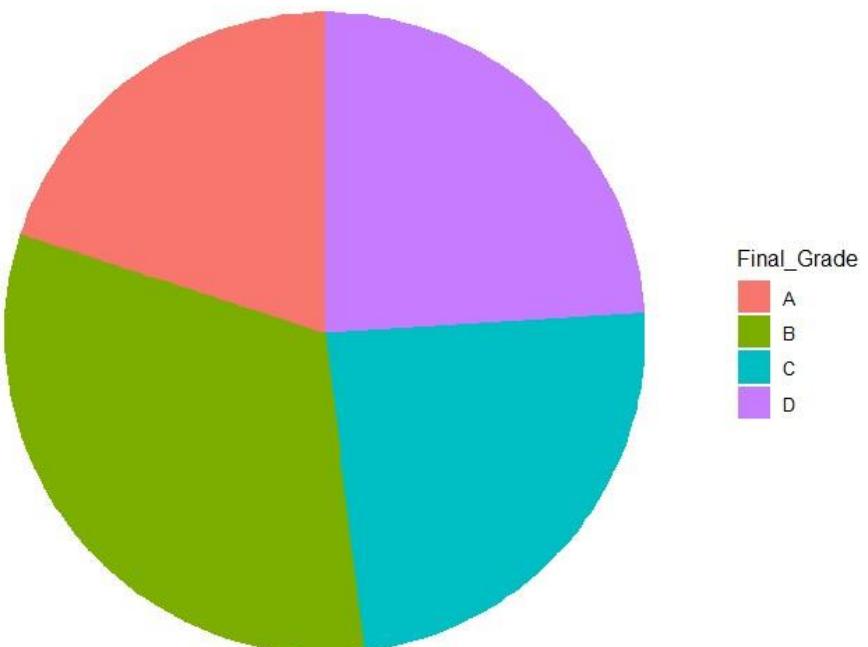
```
1 # Roll No : 23BAD101
2 # =====
3
4 library(ggplot2)
5 library(dplyr)
6 library(tidyr)
7
8 df <- x1_student_performance
9
10 df$subject <- as.factor(df$subject)
11 df$Final_Grade <- as.factor(df$Final_Grade)
12
13 df <- df %>%
14   mutate(Average_Internal = (Internal_Test1 + Internal_Test2 + Assignment_Marks)/3)
15
16 # Bar Chart
17 ggplot(df %>% group_by(subject) %>% summarise(Avg = mean(Average_Internal, na.rm = TRUE)),
18         aes(Subject, Avg, fill = Subject)) +
19   geom_bar(stat = "identity") +
20   ggtitle("Subject-wise Average Marks")
21
22 # Line Chart
23 ggplot(df %>%
24   summarise(Test1 = mean(Internal_Test1, na.rm = TRUE),
25             Test2 = mean(Internal_Test2, na.rm = TRUE)) %>%
26   pivot_longer(everything(), names_to = "Test", values_to = "Marks"),
27   aes(Test, Marks)) +
28   geom_line(group = 1) +
29   geom_point() +
30   ggtitle("Performance Trend Across Tests")
31
32 # Pie Chart
33 ggplot(df %>% count(Final_Grade),
34         aes("", n, fill = Final_Grade)) +
35   geom_bar(stat = "identity") +
36   coord_polar("y") +
37   ggtitle("Grade Distribution") +
38   theme_void()
```

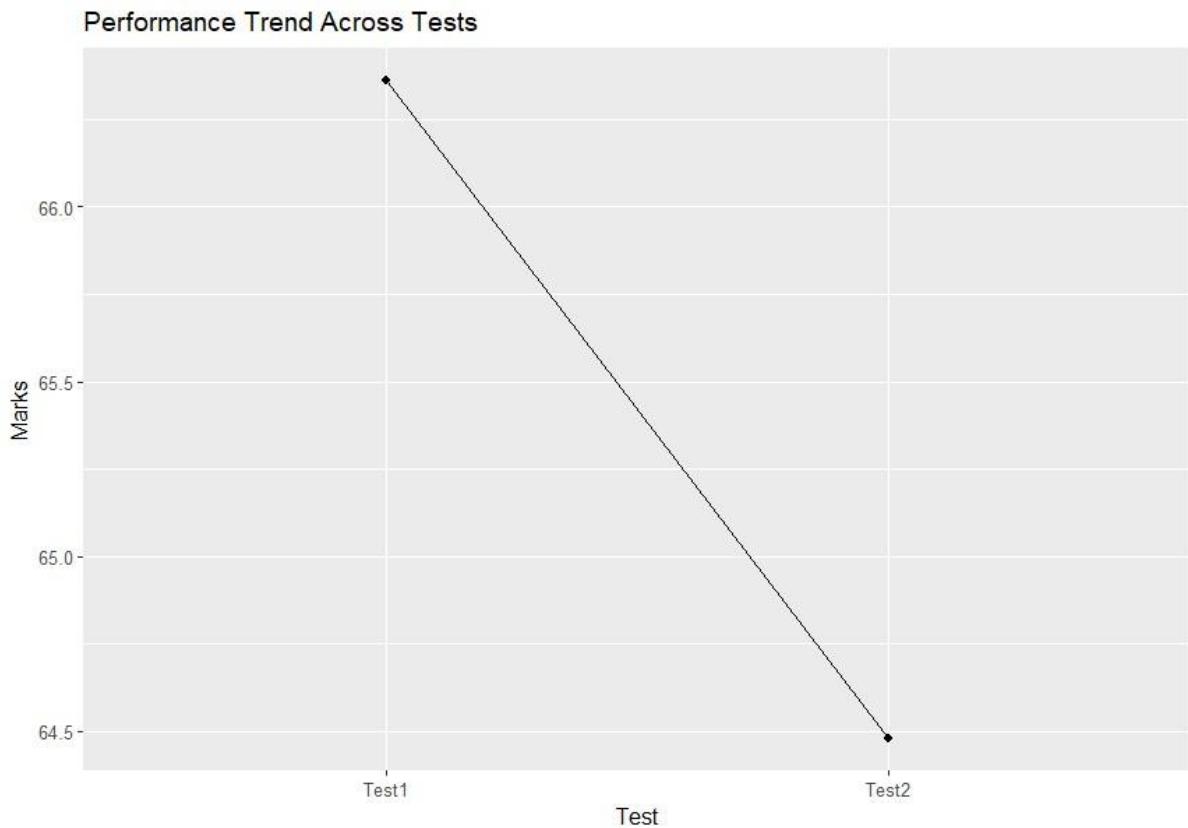
SCREENSHOT OF OUTPUT

Subject-wise Average Marks



Grade Distribution





POST-LAB QUESTIONS (PROVIDE BRIEF ANSWERS TO THE FOLLOWING QUESTIONS)

1. Which subject shows consistently low performance and why?
Ans: Subjects like DAA show comparatively lower performance due to higher conceptual difficulty.
2. Why is a line chart suitable for trend analysis?
Ans: A line chart clearly shows changes in performance over time or across tests.
3. What limitations does a pie chart have in analytics?
Ans: Pie charts are not suitable for precise comparison when many categories are present.
4. How can this analysis help curriculum planning?
Ans: It helps identify difficult subjects and supports syllabus revision and improved teaching methods.
5. How can such visualizations be integrated into AI-driven academic analytics
Ans: They can be used to train AI models for performance prediction and personalized learning recommendations.

ASSESSMENT

Description	Max Marks	Marks Awarded
Pre Lab Exercise	5	
In Lab Exercise	10	
Post Lab Exercise	5	
Viva	10	
Total	30	
Faculty Signature		