EXPT NO:1	Implementation of data charts
DATE: 06.01.2026	

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

1. **How can visualization help an academic institution improve student outcomes?**
   Visualization helps teachers quickly spot students who are struggling or falling behind in specific subjects. It allows for early intervention, such as extra coaching, to help those students improve their grades.

2. **Which chart types are suitable for comparing subject-wise performance?**
   Bar charts are perfect for comparing different subjects side-by-side because they clearly show which ones have higher or lower scores.

3. **What type of data scale is used for student marks?**
   Student marks usually use a Ratio scale because they have a starting point of zero and the differences between scores are meaningful.

4. **Why should raw academic data be cleaned before visualization?**
   Cleaning removes errors like duplicate entries or missing scores that could lead to wrong conclusions. It ensures that the final charts are accurate and show the real performance of the students.

5. **How does visualization support evidence-based decision making?**
   Instead of guessing, administrators can use clear charts as proof to decide which subjects need a better syllabus or more teaching staff. Visual data provides "evidence" that justifies changes in teaching methods to improve results.

IN-LAB EXERCISE:
OBJECTIVE:
To design appropriate data charts to analyze and compare academic performance indicators.

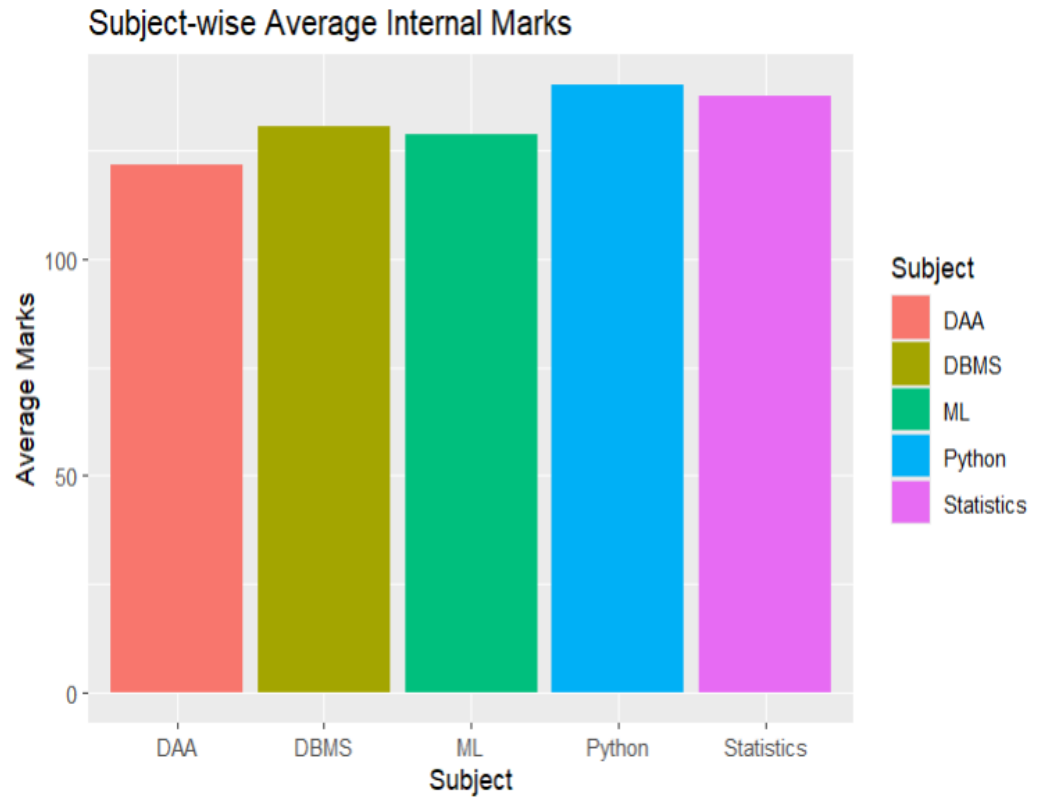
SCENARIO:
An autonomous engineering college wants to analyze internal assessment performance of first-year students across five subjects to identify difficult courses and improve teaching strategies.

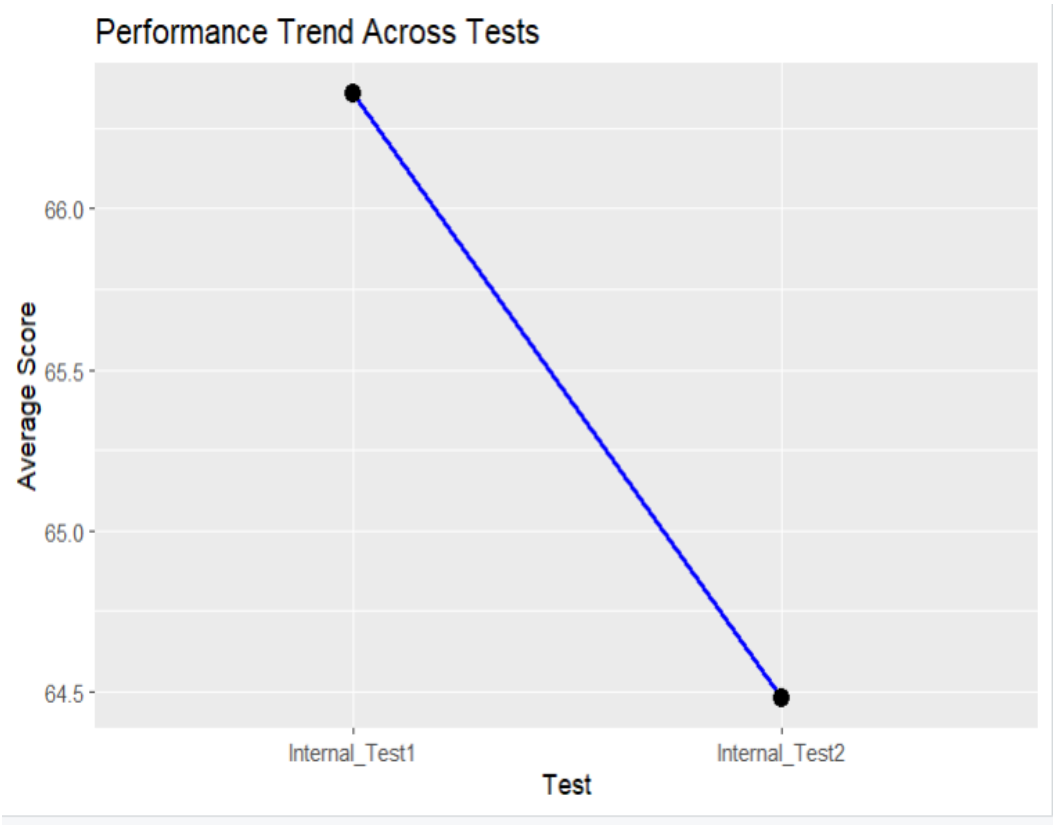
IN-LAB TASKS (Using R Language)
- Load required R libraries (ggplot2, dplyr)
- Import dataset using read.csv()
- Perform basic data preprocessing
- Create bar chart for subject-wise average marks
- Generate line chart for performance trend across tests
- Plot pie chart for grade distribution

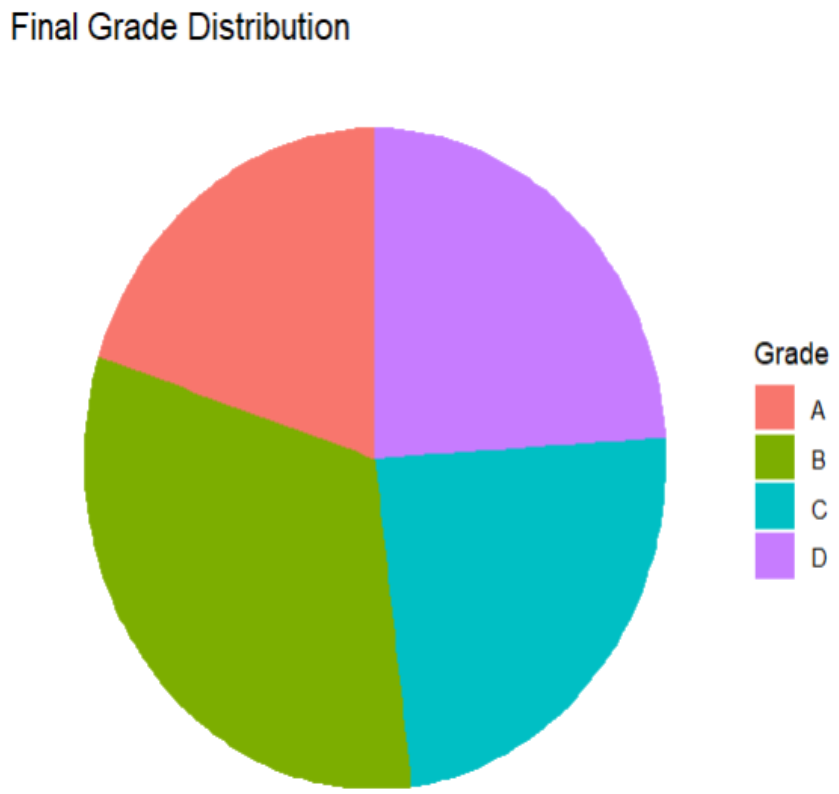
CODE:

```r
#..................
#Roll No : 23BAD076
#..................

library(ggplot2)
library(dplyr)
student_data <- read.csv("1.student_performance.csv")
head(student_data)
summary(student_data)
sum(is.na(student_data))
avg_marks <- student_data %>%
  group_by(Subject) %>%
  summarise(Mean_Marks = mean(Internal_Test1 + Internal_Test2, na.rm = TRUE))

# Plot the Bar Chart
ggplot(avg_marks, aes(x = Subject, y = Mean_Marks, fill = Subject)) +
  geom_bar(stat = "identity") +
  labs(title = "Subject-wise Average Internal Marks", y = "Average Marks")
test_trends <- data.frame(
  Test = c("Internal_Test1", "Internal_Test2"),
  Average = c(mean(student_data$Internal_Test1), mean(student_data$Internal_Test2))
)

# Plot the Line Chart
ggplot(test_trends, aes(x = Test, y = Average, group = 1)) +
  geom_line(color = "blue", size = 1) +
  geom_point(size = 3) +
  labs(title = "Performance Trend Across Tests", y = "Average Score")
grade_counts <- as.data.frame(table(student_data$Final_Grade))
colnames(grade_counts) <- c("Grade", "Count")

# Plot the Pie Chart
ggplot(grade_counts, aes(x = "", y = Count, fill = Grade)) +
  geom_bar(stat = "identity", width = 1) +
  coord_polar("y", start = 0) +
  labs(title = "Final Grade Distribution") +
  theme_void()
```

OUTPUT:


Subject-wise Average Internal Marks
Average Marks
100
50
0
DAA
DBMS
ML
Python
Statistics
Subject
Subject
DAA
DBMS
ML
Python
Statistics


Performance Trend Across Tests
Average Score
66.0
65.5
65.0
64.5
Internal_Test1
Internal_Test2
Test



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

1. **Which subject shows consistently low performance and why?**
   DAA shows the lowest performance because the subject requires complex logical and mathematical proofs.

2. **Why is a line chart suitable for trend analysis?**
   A Line chart clearly shows changes in performance over time or across tests.

3. **What limitations does a pie chart have in analytics?**
   Pie charts make it difficult to accurately compare the exact sizes of different slices.

4. **How can this analysis help curriculum planning?**
   This analysis identifies "bottleneck" subjects like DAA where students struggle most, allowing administrators to simplify the syllabus or allocate more teaching hours.

5. **How can such visualizations be integrated into AI-driven academic analytics**
   Visualizations feed data patterns into AI to automatically flag "at-risk" students showing declining trends. This allows AI to predict future results and suggest personalized study paths for specific weak subjects.

ASSESSMENT

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