**Session 2025-2026**

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| **Vision:** To equip learners with practical skills in data analysis by exploring and estimating meaningful statistics from real-world survey data using R. This course/project focuses on hands-on understanding of data import, exploration, visualization, and statistical estimation, empowering users to draw insightful conclusions about a population’s characteristics through reproducible and interpretable workflows. | **Mission:** To provide a practical and accessible learning experience that guides users through the process of exploring, analyzing, and estimating key values from the survey dataset in R. Through step-by-step instructions and hands-on exercises, we aim to build confidence in statistical reasoning, data visualization, and interpretation, enabling users to transform raw data into meaningful insights that inform real-world decisions. |

**Program Educational Objectives of the program (PEO):** (broad statements that describe the professional and career accomplishments)

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| PEO1 | **Preparation** | **P: Preparation** | **Pep-CL abbreviation**  **pronounce as Pep-si-lL easy to recall** |
| PEO2 | **Core Competence** | **E: Environment (Learning Environment)** |
| PEO3 | **Breadth** | **P: Professionalism** |
| PEO4 | **Professionalism** | **C: Core Competence** |
| PEO5 | **Learning Environment** | **L: Breadth (Learning in diverse areas)** |

**Program Outcomes (PO):** (statements that describe what a student should be able to do and know by the end of a program)

**Keywords of POs:**

Engineering knowledge, Problem analysis, Design/development of solutions, Conduct Investigations of Complex Problems, Engineering Tool Usage, The Engineer and The World, Ethics, Individual and Collaborative Team work, Communication, Project Management and Finance, Life-Long Learning

**PSO Keywords:** Cutting edge technologies, Research

“I am an engineer, and I know how to apply engineering knowledge to investigate, analyse and design solutions to complex problems using tools for entire world following all ethics in a collaborative way with proper management skills throughout my life.” *to contribute to the development of cutting-edge technologies and Research*.

**Integrity:** I will adhere to the Laboratory Code of Conduct and ethics in its entirety.

**Name and Signature of Student and Date**

(Signature and Date in Handwritten)

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| **Session** | **2024-25 (ODD)** | | **Course Name** | **Computer Workshop Lab** | |
| **Semester** | **5** | | **Course Code** | **23IOT1306** | |
| **Roll No** | **4** | | **Name of Student** | **Deepali Jichkar** | |
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| Practical Number | |  | | | |
| Course Outcome | | 1. Understand the fundamentals of computer hardware and working of Linux operating  system  2. Use Linux commands to manage files and file systems  3. Execute Scripts  4. Debug Programs on various IDEs | | | |
| Aim | | Solve the problems using probability distribution in R for discrete random variables. | | | |
| Problem Definition | | A local bakery sells three types of pastries: Croissants, Muffins, and Donuts. The daily sales  for each type of pastry follow a certain probability distribution. The owner wants to  understand the sales pattern better to manage inventory efficiently. | | | |
| Theory  (100 words) | | In statistics, a discrete random variable is a random variable  that can only take on a countable number of distinct values:  Definition  A discrete random variable can have a finite or infinite number of possible values. It usually a count, but not always.  Probability distribution  The probability distribution of a discrete random variable is a list of probabilities associated  with each possible value. It&#39;s also known as the probability mass function (PMF) or  probability function.  Expected Value To find the expected value, E(X), or mean μ of a discrete random variable X,  simply multiply each value of the random variable by its probability and add the products.  The formula is given as E ( X ) = μ = ∑ x P ( x )  Variance and Standard Deviation are the two important measurements in statistics.  Variance is a measure of how data points vary from the mean, whereas standard deviation is  the measure of the distribution of statistical data. | | | |
| Procedure and Execution  (100 Words) | | Variance Formula:  The population variance formula is given by:  σ=N1​i=1∑N​(xi​−μ)2​  Here,  σ2 = Population variance  N = Number of observations in population  Xi = ith observation in the population  μ = Population mean  The sample variance formula is given as:  Here,  s2 = Sample variance  n = Number of observations in sample  xi = ith observation in the sample  = Sample mean  Standard Deviation Formula  s=n−11​i=1∑n​(xi​−xˉ)2​  The population standard deviation formula is given as:  σ=N1​i=1∑N​(xi​−μ)2​  Here,  σ = Population standard deviation | | | |
| Code:  # Define values and probabilities  pastries <- list(  Croissants = list(x = 0:3, p = c(0.1, 0.3, 0.4, 0.2)),  Muffins = list(x = 0:3, p = c(0.2, 0.4, 0.3, 0.1)),  Donuts = list(x = 0:3, p = c(0.3, 0.4, 0.2, 0.1))  )  # Function to calculate stats  calculate\_stats <- function(x, p) {  expected <- sum(x \* p)  variance <- sum((x - expected)^2 \* p)  std\_dev <- sqrt(variance)  return(list(Expected = expected, Variance = variance, Std\_Dev = std\_dev))  }  # Calculate and print stats  for (name in names(pastries)) {  x <- pastries[[name]]$x  p <- pastries[[name]]$p  stats <- calculate\_stats(x, p)  cat("\n", name, ":\n")  cat(" Expected Value:", stats$Expected, "\n")  cat(" Variance:", stats$Variance, "\n")  cat(" Standard Deviation:", stats$Std\_Dev, "\n")  }  # Plotting  par(mfrow = c(1, 3))  for (name in names(pastries)) {  x <- pastries[[name]]$x  p <- pastries[[name]]$p  barplot(p,  names.arg = x,  main = paste(name, "Distribution"),  xlab = "Number Sold",  ylab = "Probability",  col = "skyblue",  border = "black")  } | | | |
| Output: | | | |
| Output Analysis | | The R code models the sales distributions of Croissants, Muffins, and Donuts, each with possible sales ranging from 0 to 3 units and associated probabilities. It calculates the expected value (mean), variance, and standard deviation for each distribution, followed by bar plots illustrating these distributions. | | | |
| Link of student Github profile where lab assignment has been uploaded | |  | | | |
| Conclusion | | Hence,successfully solved problems using probability distribution in R for discrete random  variables. | | | |
| Plag Report (Similarity index < 12%) | | [https://pjlce.edu.in/](https://pjlce.edu.in/" \t "_blank) | | | |
| Date | |  | | | |