Vidya Prasarak Mandal's

B. N. Bandodkar College of Science (Autonomous), Thane

Department of Statistics

Syllabus for

Programme: Certificate Course

Course: Basics of R Software

Course Code: BC009

With effect from academic year

2018 - 2019

Syllabus of
Course: Basics of R Software

UNIT	SUB-TOPICS
I	***Fundamentals of R:-*** **Introduction (Introduction to R, Installation of R, Starting & Ending in R, Getting help in R)** What is Statistics ?(with Examples), What is Data? **Basic operations** → + , - , *,÷, ^, sqrt. **Numerical Functions** →log10, log, sort, max, min, unique, range, length, var, prod, sum, dim, etc. **Data Types** →Vector, List, Matrices, Array and data frames **Variable types and Factor**→ Logical, Numerical, Integer, Complex, Character. R-Commands to Input data **a) Assignment statement:** • =, <- or -> **b) Creating vectors:** • c( ) → Concatenate Function • scan( ) → Scan Function c) **Generating sequences** • : → Sequence operator • seq( ) → (from=a ,to=b,by=c) • seq(length=d,from=a,by=c) d) **Replicating object or elements**: • rep( ) → Replicate function **e) Matrix Operations:** • matrix( ) [With examples] **Data manipulation** → Selecting random N rows, Removing duplicate rows, Renaming variables, Creating a new variable, Selection of random fraction of rows, Appending of rows and columns, Simulation of variables. • Data frames [With examples] Accessing value /data from data frames. *** Inbuilt data sets and Resident data** *** Data Processing** → Data Import and Export , Setting working directory, Checking structure of data: str( ), class( ), changing types of variables (for ex. as.factor, as.numeric)
II	***Descriptive Statistics:-*** **a) Data Visualization :- (Graphs and Diagrams)** Simple bar diagram, Sub divided bar diagram, Multiple bar diagram, Pie diagram, Box plot for one and more variables, Histogram Frequency polygon, Frequency curve, Stem and leaf, Scatter plot. **b) Measures of central tendency :-** • Mathematical averages : Mean (A.M., G.M., H.M.) • Positional averages : Median, Quartiles, Deciles, Percentiles • Mode

	c) **Calculations of Measures of Central Tendency using R** (psych package) Examples solved using R Ungrouped data Ungrouped data with NA values **Measures of Dispersion** • Range, Coefficient of Range • Quartile Deviation, Coefficient of Quartile Deviation • Mean Deviation about a (Mean, Median), Coefficient of Mean Deviation • Variance, Standard Deviation, Coefficient of Variation **Measures of Skewness** • Absolute Measures of Skewness • Karl Pearson's Measures of Skewness • Bowley's Measures of Skewness **Relative or Coefficient of Skewness** • Karl Pearson's Coefficient of Skewness • Bowley's Coefficient of Skewness • Measure based on Moments **Kurtosis** :- Leptokurtic, Mesokurtic, Platykurtic (Examples)
III	***Probability and Probability Distributions:-*** **Probability (Introduction)** P(A)=n(A)/n(S) = Total no. Of cases favourable to Event A/Total no. Of cases *** Permutations, Combinations** *** Probability** **Probability Distributions** • Binomial Distribution • Poisson Distribution • Uniform Distribution • Exponential Distribution • Normal Distribution • Student's t Distribution • F Distribution • Chi Square Distribution (With Examples) *** Testing of Hypothesis** *** Statistical Tests using R** • t-test (One Sample t test, Two Sample t test, Paired t test) • Chi-Square Test for Association • Chi-Square Test for Variance • F-test for Equality of Variances
IV	***Correlation Analysis, Linear Regression Analysis and Curve Fitting:-*** **Introduction :-** **Linear Regression Model** with One Explanatory variable • **Data Pre-processing** :- Detection and Treatment of Missing values and Outliers, Model building • Interpretation of Output produced by lm command in R. **Multiple Linear Regression Model**

	• Data Pre processing **Curve Fitting** • Quadratic Curve • Exponential Curve • Power Curve • Logarithmic Curve

Evaluation Scheme

Assignments and Practical Examination

1] Assignment: i) Unit I and II
ii) Unit III and IV

Internal Assignments have to be submitted in the hard copy format in the department

Total number of assignments: 04 each carrying 5 marks; Total marks: 20

2] Practical Examination: Unit I , II , III and IV

Details	Marks
Practical	80

Total of Internal Assignments 20 Marks
Total of Practical Examination 80 Marks
Grand Total 100 Marks

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