## (Skill Enhancement Course)

# **15 A. INFERENTIAL STATISTICS AND SOFTWARE PACKAGES**

**Course Objective:** This course provides theoretical knowledge and practical skills about various inferential statistics such as probabilities, test of significance, multiple regression and also skill for using software like MS Excel and SPP for data analysis.

**Course Learning Outcomes:** Upon completion of this course, students shall be able to achieve the following outcomes:

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**CO1:** Interpret the concept and theory of probability

**CO2:** Analyse and apply the different probability distributions

CO3: Learn and Demonstrate the skills on various tests of significance

CO4: Learn and use of multiple regression model in economics

CO5: Use Excel sheets and SPSS package to analyse the data and derive the results

## **Unit 1: Concept and Theories of Probability**

- Concept and Definitions of Probability: Classical or Mathematical and Empirical or Statistical Axiomatic Approach to Probability
- Theorems of Probability: Addition and Multiplication (without proofs).

## **Unit 2: Theoretical Probability Distributions**

- Binomial Distribution: Constants (without proof) and Properties and Applications
- Poison Distribution: Constants (without proof) and Properties and Applications
- Normal Distribution: Constants (without proof) and Properties and Applications
- Standard Normal Distribution, Standard Normal Curve and their Applications

#### Unit 3: Test of Significance - Large and Small Sample Tests

- Steps involved in Testing of Hypotheses; Testing the difference between Means and Proportions
- Large Sample or Z-Test, Small Sample Tests, Difference between them
- Applications of Student's t-test,  $\chi^2$  test, F-test
- One way and Two way ANOVA

# **Unit 4: Linear Multiple Regression Model**

- Three Variable Linear Multiple Regression Model: Notation, Assumptions
- Estimation of Partial Regression Coefficients Interpretation of Regression coefficients
- Testing the coefficients: t-test, p- value
- Coefficient of Determination: R<sup>2</sup> and adjusted R<sup>2</sup>

#### **Unit 5: Excel and SPSS for Data Analysis**

- Excel: Worksheet, Creating Tables, Graphs and Charts
- Mathematical and Statistical Functions in Excel and Data Analysis Pack: Descriptive Statistics, Correlation and Regression
- SPSS: Introduction, Opening Excel files in SPSS, Analysis Tools: Descriptive Statistics
- Estimation of Regression Coefficients using SPSS and their interpretation.

#### **References:**

- 1. S. C. Gupta: Fundamentals of Statistics, Himalaya Publishing House, Bombay, 1982.
- 2. S. P. Gupta: Statistical Methods, S. Chand & Company, New Delhi, 2000.
- 3. K. V. S. Sharma :*Statistics Made Simple: Do it yourself on PC, (Second edn.)* Prentice Hall of India, New Delhi, 2010.
- 4. తెలుగుఅకాడమీ(పచురణ "పరిమాణాత్మకపద్ధతులు"
- 5. B. N. Gupta: Statistics Theory and Practice, SahityaBhavan, Agra, 1992.
- 6. Goon A.M., M. K. Gupta and B. Dasgupta: *Fundamentals of Statistics*, Vol.1, The World Press, Ltd, Calcutta, 1975.
- 7. Nagar, A.L. and R. K. Das: *Basic Statistics*, Oxford University Press, New Delhi, 1996.
- 8. *D N Elhance*, VeenaElhance& B M Aggarwal *Foundation of Statistics*, KitabMahal, New Delhi, 2018.
- 9. Relevant web resources suggested by the teacher and college librarian.

#### **Suggested Activities:**

**Mandatory** (*Training of students in the related skills by the teacher for a total 10 Hours*) 1) **For Teacher**: Training of students by teacher in the classroom and in the field for a total of not less than10 hours on skills and hands on experience like calculation and interpretation normal curve, Z-values, t-test,  $\chi^2$  test, F-test, ANOVA, regression results, t, p and R<sup>2</sup>values using Excel and/or SPSS. The expertise of practicing persons can be utilized for this purposes.

2) **For Student:** Students shall take up a real time data of any economic organisation or firm and calculate the important statistical tests for the data and write the results with interpretations in the given format, not exceeding 10 pages, and submit to the teacher, as Fieldwork Report

#### 3) **Suggested Fieldwork Format** (*Report shall not exceed 10 pages*):

Title Page, Student Details, Acknowledgments, Index page, Objectives, Step-wise process, Findings, Conclusion & References.

4) Max Marks for Fieldwork Report: 05

5) Unit Tests/Internal Examinations.

#### **Suggested Activities**

- Unit-1: Assignment on concept and theory of probability
- Unit-2: Group discussion on comparison of various probability distribution theories
- Unit-3: Exercises on solving various tests of significance
- Unit-4: Project on application of multiple regression model to given a data set
- Unit-5: Practical sessions on use of Excel and SPSS for data analysis.