DISCIPLINE SPECIFIC MINOR COURSE IN STATISTICS: DSM-151
(Statistical Methods and Probability)
(Credits: 03)
Contact Hours: 45 Hours
Full Marks = 100 [End Semester Exam (70) +Internal (30)]
Pass Marks = 40 [End Semester Exam (28) +Internal(12)]

Learning objectives

- To develop skills in graphical representation of data.
- To understand measures of central tendency, dispersion, and combined mean and variance to analyze data.
- To understand moments, skewness, and kurtosis to assess the characteristics of data.
- To gain proficiency in fitting curves including polynomials and exponential curves to data.
- To understand correlation coefficients including Karl Pearson's correlation coefficient and Spearman rank correlation coefficient.

Learning outcomes

- Interpret various types of graphs used for data vizualization.
- Interpret measures of central tendency, dispersion, and combined mean and variance to summarize and analyze data.
- Analyze the distributional properties of data using moments, skewness, and kurtosis.
- Interpret the results of fitted curves, such as polynomials and exponential curves to a data set.
- Interpret Karl Pearson's correlation coefficient and Spearman rank correlation coefficient to assess the strength and nature of relationships between variables.

UNIT I

Definition, scope and limitations of Statistics, concepts of statistical population and sample, quantitative and qualitative data, nominal, ordinal and time-series data, discrete and continuous data. Presentation of data by tables and diagrams, frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency curves (inclusive and exclusive method).

UNIT II

Measures of central tendency: arithmetic mean, median, mode, geometric mean, harmonic mean, partition values. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, variance. Coefficient of dispersion: coefficient of variation. Moments: raw and central moments. Measures of skewness and kurtosis.

UNIT III

Bivariate data: scatter diagram, Karl Pearson's coefficient of correlation. Spearman's rank correlation coefficient (Introductory with interpretation). Regression: lines of regression, properties of regression coefficients, angle between two regression lines. Principle of least-squares and fitting of linear equations, polynomials and exponential curves. Coefficient of determination.

UNIT IV

Random experiment, sample point and sample space, event, algebra of events. Definition of probability: classical, relative frequency and axiomatic approaches to probability, merits and demerits of these approaches (only general ideas to be given).

UNIT V

Addition and multiplication theorems of probability, theorem of total probability, conditional probability. Examples based on laws of addition, multiplication and conditional probability. Independent events: pairwise and mutual independence. Bayes' theorem and its applications.

SUGGESTED READINGS

6. Freund, J. E. (2009). Mathematical Statistics with Applications (7thEd.). Pearson Education.
7. Goon, A.M., Gupta, M.K., &Dasgupta,B. (2005). Fundamentals of Statistics,Vol.I (8th Ed.). World Press, Kolkata.
8. Gupta, S.C., &Kapoor, V.K. (2007). Fundamentals of Mathematical Statistics (11th Ed.). Sultan Chand and Sons.
9. Hogg, R.V., Craig,A.T., &McKean,J.W. (2005). Introduction to Mathematical Statistics (6th Ed.). Pearson Education.
10. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics (3rd Ed.). Tata McGraw Hill Publication.

INTER DISCLIPLINARY COURSE IN STATISTICS: IDC-101

(Introduction to Statistics)
(Credits: 03)
Contact Hours: 45 Hours