Statistical Methods I

Semester II	Subject Code: BS21505	Lectures : 40

Objectives:

The syllabus aims in equipping students with -

- Ability to prepare for postgraduate work or study in various fields of Statistics.
- Developing attitudes which aim to make them responsible members of the society.
- The methodology of designing research tools and interpretation and analysis of results and report writing.
- Application orientation of logic and objectivity in solution of problems of development and growth.
- Ability to offer research and consultancy services to advance societal development
- Sustainability in emerging process of digital technology and confront the challenges of modern technology and information system.

Unit 1: Regression (for ungrouped data)	No. of Lects.
• Regression, illustrations, appropriate situations for regression and correlation • Linear regression • Fitting of straight line using least squares method • Properties of regression coefficients : $b_{xy} \cdot b_{yx} = r^2 \leq 1$, $byx = r(\sigma_y / \sigma_x)$ and $b_{xy} = r\ (\sigma_x/\sigma_y)$ • Non-linear regressions models : second degree curve, curve models: $Y = ab^X$, $Y = aX^b$ • Numerical Problems	(08)

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Unit 2: Multiple and Partial Regression and Correlation (For trivariate data)	No. of Lects.
• Yule's notation and concept of multiple regression • Fitting of multiple regression planes • Partial regression coefficients, interpretation • Multiple correlation coefficients, concept, definition, computation and interpretation • Partial correlation coefficients, concept, definition, computation and interpretation • Numerical Problems	(10)

Unit 3: Time Series	No. of Lects.
• Meaning and utility • Components of time series • Additive and multiplicative models • Methods of estimating trend : moving average method, least squares method and exponential smoothing method • Elimination of trend using additive and multiplicative models • Simple time series models : AR(1), AR(2) (only theory) • Numerical problems	(08)

Unit 4: Statistical Quality Control (SQC)	No. of Lects.
• Introduction to seven process control (PC) tools • Quality, causes of variation, lot and process control, control charts ($\bar{X}$, R,) σ- Known & unknown, control limits • Numerical problems	(08)

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Unit 5: Index Numbers	No. of Lects.
• Introduction • Definition and Meaning • Points to be considered in construction of Index numbers. • Concept of price and quantity index numbers. • Simple and weighted price index numbers. • Laspeyre's, Passche's and Fisher's Index numbers. • Numerical problems	(06)

Note : Theorems are to be studied without proof (wherever applicable)

Recommended Text Books:

- Gupta S. C.and Kapoor V. K. 1987, Fundamentals of Applied Statistics (3rd Edition) S. Chand and Sons, New Delhi.
- Kulkarni M.B., Ghatpande S.B.,Gore S.D. 1999, Common Statistical Tests Satyajeet Prakashan, Pune
- Kulkarni M.B., Ghatpande S.B. 2007, Introduction to Discrete Probability and Probability Distributions SIPF Academy
- Sarma K.V.S. 2001 Statistics Made Simple. Do it Yourself on P.C. Prentice Hall

Recommended References:

- Medhi J. 1992, Statistical Methods (An Introductory Text), New Age International
- Freund J.E. 2005, Modern Elementary Statistics Pearson Publication
- Trivedi K.S. 2001, Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science Prentice Hall of India, New Delhi 9
- Ross S. M. 2006, A First Course In Probability 6th Edition Pearson publication
- Law A. M. and Kelton W. D. 2007, Simulation Modelling and Analysis Tata McGraw Hill
- Box G. E. P. and Jenkins G. M. 2008, Time Series Analysis, 4th edition Wiley
- Brockwell P. J. and Davis R. A. 2006, Time Series Methods Springer
- Snedecor G. W. Cochran W. G. 1989, Statistical Methods John Wiley & sons

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