

**Statistical Methods:** Decision theoretic approach to estimation and testing. Application of Normal,  $t$ ,  $\chi^2$  and F-distributions in testing, Analysis of Variance in Linear Models, Methods of Estimation (Minimum Variance Method, Maximum Likelihood Estimation Method) and examples.

**UNIT IV: Sequential tests and Non-parametric Methods:**

**10 Hours**

**Sequential tests:** Wald's Sequential Probability Ratio Test, OC and ASN functions (Binomial, Poisson and Normal).

**Non-parametric Methods of testing:** Sign test, Wilcoxon test, Mann-Whitney test and Kolmogorov one sample test.

**Reference Books:**

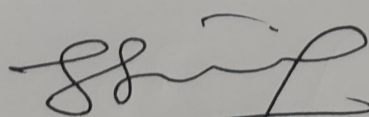
**UNIT-I & II**

1. **C. R. Kothari, (1990):** Research Methodology: Methods and Techniques. New Age International, 418p.
2. **S. C. Sinha, A. K. Dhiman, (2002):** Research Methodology, Ess Publications, 2 Volumes.
3. **Kumar Ranjit, (2005):** Research Methodology. A step by step Guide for Beginners, 2<sup>nd</sup> edition, Pearson Education.
4. **Alasdair MacIntyre, (1967):** A short story of Ethics, London.
5. **P. Chaddah, (2018):** Ethics in Competitive Research, Do not get scooped; Do not get plagiarized, ISBN: 978-9387480865.
6. Indian National Science Academy (INSA) Ethics in Science and Education, Research and Government (2019) ISBN: 978-81939482  
[http://www.insaindia.res.in/pdf/Ethics\\_Books.pdf](http://www.insaindia.res.in/pdf/Ethics_Books.pdf).

**UNIT-III & IV:**

7. **Bhat, B.R.:** Modern Probability Theory, 3<sup>rd</sup> Edition, New Age India.
8. **Rao, C.R.:** Linear Statistical Inference
9. **Rohatgi, V.K.(1988):** Introduction to Probability theory and Mathematical Statistics, Wiley Eastern.
10. **Feller, W.:** An Introduction to Mathematical Statistics.

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**Chairperson**  
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**Faculty of Science**  
**Department of Statistics**  
**KAKATIYA UNIVERSITY- WARANGAL**  
**Pre-Ph.D. Syllabus - STATISTICS**  
**Paper-I: Research Methodology**

**UNIT I: Research problem and hypothesis**

**12 Hours**

**Formulation of Research Problem:** Identification and formulating the research problem - Assessing the status of the problem –Independent, Dependent and Intervening variables, Experimental group and Control group- Formulating the objectives –The nature and types of hypothesis. Stating a hypothesis, Criteria of hypothesis and functions of hypothesis- Review of literature and patents - Identifying gap areas - Development of research plan: Exploration, description, diagnosis and experimentation.

**Reporting and thesis writing:** Preparation of manuscript for Publication of Research paper - Oral presentation - Importance of effective communication - Types of report and structure: Research paper, Research project proposal, GANTT Chart, Research project report, Thesis - Illustrations - Pictures and tables - Footnotes - Acknowledgement - Bibliography - Citation styles.

**UNIT II: Research publications**

**12 Hours**

**Publication ethics:** Definition - Introduction and importance - Best practices/standards - Setting initiatives and guidelines - Conflicts of interest - Violation of publication ethics, authorship and contributor ship – Intellectual property right, Publication misconduct, complaints and appeals - Predatory publishers and journals – Plagiarism and Software tools (Turnitin, Urkund and Ouriginal)

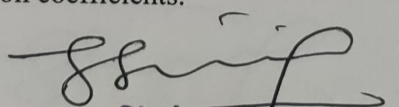
**Research metrics:** Open Access and Subscribed journals - Indexed journals - Science Citation Index (SCI) - Engineering Index (EI) – Scopus Indexing – Consortium for Academic and Research Ethics (CARE) listed journals - SNIP, SJR, IPP, Cite Score. Impact factor of journal as per journal citation report - Individual and Institutional Metrics: Definition and Importance of h-index, g-index, i10-index.

**UNIT III: Distribution Theory and Statistical Methods:**

**14 Hours**

**Distribution Theory:** Probability Distributions-Binomial, Poisson, Negative Binomial, Geometric, Multinomial distributions. Uniform, Normal, Exponential, Cauchy, Weibull, Gamma, Beta distribution of I and II types, Bi-variate and Multivariate Normal.

Exact Sampling distributions-t,  $\chi^2$  and F- distributions. Asymptotic Distributions of the correlation and regression coefficients.

  
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