

## **Syllabus for Research Methodology for the Ph. D. entrance examination of Chemistry**

Research – Qualities of Researcher – Components of Research Problem – Various Steps In Scientific Research – Types of Research – Hypotheses Research Purposes - Research Design – Survey Research – Case Study Research. Data Collection and interpretation, – Sources of Data – Primary Data – Secondary Data - Procedure Questionnaire – Sampling Methods – Merits and Demerits – Experiments – Observation Method – Sampling Errors - Type-I Error & Type-II Error. Statistical Analysis – Introduction To Statistics – Probability Theories – Conditional Probability, Poisson Distribution, Binomial Distribution and Properties of Normal Distributions – Hypothesis Tests – One Sample Test – Two Sample Tests / Chi-Square Test, Association of Attributes - Standard Deviation – Co-Efficient of Variations . Statistical Applications – Correlation and Regression Analysis – Analysis of Variance – Partial and Multiple Correlation – Factor Analysis and Conjoint Analysis – Multifactor Evaluation – Two-Factor Evaluation Approaches. Research Reports – Structure and Components of Research Report – Types of Report, Characteristics of Good Research Report, Pictures and Graphs, Research Ethics, Purpose of organizing seminars, conferences etc. Basics of computers and computer languages. Logic and Reasoning

Different instrumental techniques such as spectroscopic techniques (IR, UV-VIS, NMR, Fluorometry, Chromatography etc.) , Green Chemistry, Different practical chemistry techniques