National Institute of Technology Raipur
Chhattisgarh – 492010, India.

Syllabus for Doctor of Philosophy (Ph.D.)
Subject: Research Methodology and Technical and Scientific Applications
Credits: 4, L+T+P: (3+0+1)

Maximum Marks: 100

Introduction and Design of research: Meaning, objectives and significance of research, types and parameters of research, research process, identification and definition of the research problem, definition of construct and variables, pure and applied research design, exploratory and descriptive design methodology, qualitative vs. quantitative research methodology, field studies, field experiments vs. laboratory experiments, research design in social and physical sciences.

Data and Methods of Data Collection: Survey, assessment and analysis: data collection, primary and secondary sources of data, Collection of primary data through questionnaire and schedules. Collection of secondary data, processing and analysis of data. Sample survey, simple random sampling, stratified random sampling, systematic sampling, cluster sampling, area sampling and multistage sampling. Pilot survey, scaling techniques, validity & reliability.

Data Analysis: Procedure for testing of hypothesis, the null hypothesis, determining levels of significance, type i and ii errors, grouped data distribution, measures of central tendency, measures of spread/dispersion, normal distribution, analysis of variance: one way, two way, chi square test and its application, students 'T' distribution, non-parametric statistical techniques, binomial test. Correlation and regression analysis – discriminate analysis – factor analysis – cluster analysis, measures of relationship.

Research report preparation and presentation: Review of literature: historical survey and its necessity, layout of research plan, meaning, techniques and precautions of interpretation, types of report: technical report, popular report, report writing – layout of research report, mechanics of writing a research report. Writing bibliography and references.

Note: *Following are to be practiced in Computer Lab.: Spreadsheet application, features and functions, using formulas and functions, data storing, features for statistical data analysis, use of SPSS generating chart's/graph and other features. Document and Presentation tool: features and functions, Using Latex, Open–office and MS office, creating presentations, master page, adding animation, customizing animation, creating handouts. Web search: introduction to internet, using search engine, relevance of search terminology, Advanced search.*

Reference Books:

1. *Research in education, By J W Best and J V Kahn, Pearson/ Allyn and Bacon.*
2. *Research Methodology – Methods and Techniques, C K Kothari, New Age International.*
3. *Design and Analysis of Experiments, D C Montgomery, Wiley.*
4. *Applied Statistics & Probability for Engineers, D C Montgomery & G C Runger, Wiley.*
5. *Management Research Methodology: Integration of Principles, Methods and Techniques, K N Krishnaswamy, A I Sivakumar and M Mathiranjan, Pearson Education.*