

Course Code	Course Title	L	T	P	C
PHD18001	RESEARCH METHODOLOGY	4	0	0	4

### **Unit-I: Research Preparation and Planning**

Objectives of research – Understanding research and its goals. Critical thinking. Techniques for generating research topics. Topic selection and justification. Techniques involved in designing a questionnaire – Methods of scientific enquiry – formulation of hypotheses and testing of the same – Development of a research proposal – Theoretical and Experimental Processes.

### **Unit-II: Review of Literature and Research Resources**

Sources of information. Literature search. World Wide Web, Online data bases – search tools. Citation indices - Principles underlying impact factor – literature review – Case studies, review articles – record of research review -- Role of the librarian. Ethical and Moral Issues in Research, Plagiarism, tools to avoid plagiarism – Intellectual Property Rights – Copy right laws – Patent rights.

### **Unit- III: Research Strategies/Design**

Quantitative Research Design: Descriptive, Cross sectional, Analytical, Case Control and experimental.

Qualitative Research Design: Research Strategies - Case Studies Experiments – Ethnography-Phenomenology - Ground Theory (GT) Action Research - Mixed-Methods – Longitudinal

### **Unit-IV: Data Collection, Analysis and Inference**

Sample size determination & sampling techniques/strategies, Research tool preparation – Piloting, pre testing validity reliability. Basic Statistical Distributions and their applications. Descriptive analysis – Frequency, Crosstabs, Measures of Central Tendency, Dispersion, Skewness, Kurtosis. Inferential Analysis – Parametric and Non Parametric tests. Correlation and Regression Analysis-Time series analysis: Forecasting methods. Factor analysis, Cluster Analysis and Discriminant Analysis (Basic ideas only). Principles of Experimentation, Basic Experimental Designs: Completely Randomized Design Randomized Block Design and Latin Square Design. Factorial Designs:  $2^2$ ,  $2^3$  and  $2^4$  – Accuracy, Precision and error analysis.

### **Unit-V: Academic Writing & Presentation**

Proposal submission for funding agencies, Elements of Style. Organization of proposals, Basic knowledge of funding agencies, Research report writing, Communication skills, Tailoring the presentation to the target audience – Oral presentations, Poster preparations, Submission of research articles for Publication to Reputed journals, Thesis writing, and Research report writing, Referencing styles. Elements of excellent presentation: Preparation, Visual and Delivery. Oral Communication skills and Oral defense.

## References

1. Ganesan R, Research Methodology for Engineers, MJP Publishers, Chennai. 2011
2. Walpole R.A., Myers R.H., Myers S.L. and Ye, King: Probability & Statistics for Engineers and Scientists, Pearson Prentice Hall, Pearson Education, Inc. 2007.
3. Anderson B.H., Dursaton, and Poole M.: Thesis and assignment writing, Wiley Eastern 1997.
4. Bijorn Gustavii: How to write and illustrate scientific papers? Cambridge University Press.
5. Bordens K.S. and Abbott, B.b.: Research Design and Methods, Mc Graw Hill, 2008.
6. Graves N, Varma V: Working for a doctorate Toutledge 1997.
7. Graziano, A. M., and Raulin, M. L.: Research Methods – A Process of Inquiry, Sixth Edition, Pearson, 2007.
8. Leedy., P., D.: Practical Research – Planning and Design, Eighth Edition, Pearson., 2005.
9. Kothari C.K., Research Methodology- Methods and Techniques (New Age International, New Delhi), 2004.