

Savitribai Phule Pune University

(Formerly University of Pune)

Syllabus for M.Phil./Ph.D. (PET) Entrance Exam : Energy Studies

Research Methodology

- 1) **Foundation of Research:** Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method - understanding the language of research - Concept, Construct, definition, Variable. Research Process
- 2) **Problem Identification & Formulation:** definition and formulating the research problem, Necessity of defining the problem, Importance of literature review in defining a problem, Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good hypothesis - Null hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & importance
- 3) **Research Design:** Concept and Importance in Research - Features of a good research design - Exploratory Research Design - Concept, Types and uses, Descriptive Research Design - concept, types and uses. Experimental Design - Concept of Independent & Dependent variables.
- 4) **Qualitative and Quantitative Research:** Qualitative - Quantitative Research - Concept of measurement, causality, generalization, replication. Merging the two approaches.
- 5) **Data Collection and analysis:** Execution of the research - Observation and Collection of data - Methods of data collection, hypothesis-testing - Generalization and Interpretation.
- 6) **Measurement:** Concept of measurement - what is measured? Problem in measurement in research - Validity and Reliability. Levels of measurement - Nominal, Ordinal, Interval, Ratio.
- 7) **Sampling:** Concept of Statistical population, Sample, Sampling Frame, Sampling Error, Sample size, Non Response. Characteristics of a good sample. Probability Sample - Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample - Practical considerations in sampling and sample size.
- 8) **Data Analysis:** data Preparation - Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis - Cross tabulations and Chi-square test including testing hypothesis of association.
- 9) **interpretation of Data and Paper Writing:** Layout of a Research Paper, Journals in Energy Studies , Impact factor of journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.
Use of Encyclopedias, Research Guides, Handbook etc., Academic databases for concerned discipline .
Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/mendeley, Software for paper formating like LaTeX/MSOffice, software for detection of Plagiarism.
- 10) **Reporting and Thesis writing:** Structure and components of scientific reports - Types of report - Technical reports and thesis - Significance - Different steps in the preparation - Layout, Structure and Language of typical reports - Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation - Planning - Preparation - Practice - Making presentation - Use of visual aids - Importance of effective communication

11) Application of results and ethics: Environmental impacts - Ethical issues - ethical committees - Commercialization - Copy right - royalty - Intellectual property rights and patent law - Trade related aspects of intellectual property Rights - Reproduction of published material - Plagiarism - citation and acknowledgement - citation and acknowledgement - Reproducibility and accountability.

12) Reasoning and Mentalability: Analogy, Classification, Series, Coding-Decoding, Direction Sense, Representation Through Venn Diagrams, Mathematical Operations, Arithmetical Reasoning, Inserting the Missing Character, Number, Ranking and Time Sequence Test, Eligibility Test, Representation through Venn-diagrams, Number & symbols ordering, Comprehension questions, Statement & assumptions, Statement & conclusions, Statement & actions

Books Recommended

- 1) Research Methodology - C. R. Kothari
- 2) Research Methodology : An Introduction - Stuart Melville and Wayne
- 3) Practical Research Methods - Catherine Dawson
- 4) Select references from the Internet

REFERENCES

- 1) Garg, B. L., Karadia, R., Agarwal, F. and Agarwal, U. K., 2002. An introduction to Research Methodology, RBSA Publishers.
- 2) Kothati , C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
- 3) Sinha, S. C. and Dhiman, A. K., 2002. Research Methodology, Ess Ess Publications. 2 columes.
- 4) Trochim, W. M. K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p
- 5) Wadehra, B. L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Additional reading

- 1) Anthony, M., Graziano, A. M. and Raulin, M. L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
- 2) Carlos, C. M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.
- 3) Coley, S. M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.
- 4) Day, R. A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.
- 5) Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
- 6) Leedy, P. D. and Ormrod, J. E., 2004 Practical Research: Planning and Design, Prentice Hall.
- 7) Satarkar, S. V., 2000. Intellectual property rights and Copy right. Ess Ess Publications.

Subject Concerned Syllabus

Energy Studies

- Renewable and Non-Renewable Energy Sources
- Renewable Energy Development in India
- Renewable Energy Sources
- Solar Energy
- Wind Energy
- Small Hydropower
- Biogas, Biomass Gasification
- Hydrogen Energy
- Geothermal Energy
- Current Status of Renewable Energy in India
- Power From Renewable
- New and Emerging Renewable Energy Technologies