# Ph.D. Entrance Test Syllabus for Ph.D in (All Branches)

The PET (Ph.D. Entrance test) for **Ph.D. in (All Branches)** consists of **two parts:**

- **Part I:** Research Methodology (50 marks) and
- **Part II:** Subject Specific (Related to the branch for 50 marks)

**Total Marks for PhD Entrance Test: 100 Marks**

*The Syllabus for Research Methodology is common to all Faculties*

**SYLLABUS**

## Part I: Research Methodology (50 Marks)

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.

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**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 Computer Science, 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.

**10) Use of tools / techniques for Research:** methods to search required information Effectively, Reference Management Software like Zotero/Mendeley, Software for paper Formatting like Latex/MSOffice, Software for detection of plagiarism.

**11) 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.

**12) Application of results and ethics:** Environmental impacts - Ethical issues – Ethical committees - Commercialization - Copyright - 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.

**13) Reasoning and Mental ability**: 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


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**Reference Books:**

1) Garg, B. L., Karadia, R., Agarwal, F. and Agarwal, U. K., 2002. An introduction to Research Methodology, RBSA Publishers.
2) Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3) Sinha, S. C. and Dhiman, A. K., 2002. Research Methodology, EssEss Publications. 2Columns.
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, trademarks, copyright designs and Geographical indications. Universal Law Publishing.

**For Additional Reading:**

1) Anthony, M., Graziano, A. M. and Raulin, M. L., 2009. Research Methods: AProcess ofInquiry, Allyn and Bacon.
2) Carlos, C. M., 2000. Intellectual property rights, the WTO and developing countries: theTRIPS 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 Copyright. EssEss Publications

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