



# VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University under section 3 of the UGC Act 1956)

## Faculty of Engineering & Technology

### Ph.D Program

### Engineering & Technology

### RESEARCH METHODOLOGY -

### SYLLABUS

Total Lecture Hours :60

Credits: 4

#### **UNIT I –Objectives and types of research**

Definition of Research – Importance, limitations - Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, concept of applied and basic research process, criteria of good research.

#### **UNIT II - Research Formulations and Design**

Defining and formulating the research problem, selecting the problem, necessity of defining the problem, importance of literature review in defining a problem, literature review-primary and secondary sources, reviews, monograph, patents, research databases, web as a source, searching the web, critical literature review, identifying gap areas from literature and research database, development of working hypothesis.

#### **UNIT III – Data Collection and Analysis**

Computer and its role in research, Effective use of Internet, Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages (Sigma STAT, SPSS for student t-test, ANOVA, etc.), - Hypothesis-testing -Generalization and Interpretation.

#### **UNIT-IV - 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



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communication.

## **Unit – V Research and Publication Ethics (Theory) (15 Hours)**

### **PHILOSOPHY AND ETHICS:(3 Hours)**

1. Introduction to philosophy: definition, nature and scope, concept, branches 2. Ethics: definition, moral philosophy, nature of moral judgments and reactions.

### **SCIENTIFIC CONDUCT: (5 Hours)**

Ethics with respect to science and research 2. Intellectual honesty and research integrity 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP) 4. Redundant publications: duplicate and overlapping publications, salami slicing 5. Selective reporting and misrepresentation of data,

### **PUBLICATION ETHICS:(7 Hours)**

1. Publication ethics: definition, introduction and importance 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. 3. Conflicts of interest 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types 5. Violation of publication ethics, authorship and contributorship 6. Identification of publication misconduct, complaints and appeals 7. Predatory publishers and journals

## **RESEARCH AND PUBLICATION ETHICS (PRACTICE)(15 HOURS)(INTERNAL)**

**OPEN ACCESS PUBLISHING:(4 Hours)** 1. Open access publications and initiatives 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies 3. Software tool to identify predatory publications developed by SPPU 4. Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

**PUBLICATION MISCONDUCT:(4 Hours)** (A) Group Discussions: 1. Subject specific ethical issues, FFP, authorship 2. Conflicts of interest, 3. Complaints and appeals: examples and fraud from India and abroad (B) Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools,

**DATABASES AND RESEARCH METRICS:(7 Hours)** (A) Databases: 1. Indexing databases 2. Citation databases: Web of Science, Scopus, etc. (B) Research Metrics: 1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score 2. Metrics: h-index, g index, i10 index, altmetrics.



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## REFERENCES

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. 2 volumes.
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.

## 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. ESSESS Publications
8. Epidemiology in medicine, Charles H. Hennekens and Jules E. Burling. (1987)
9. Oxford Text Book of Public Health (5<sup>th</sup> Edition), volume Oxford University press. (2011)
10. Essentials of Medical Statistics by Bely R. Kirkwood. (2011)
11. An Introduction to biostatistics by P.S.S. Sundar Rau. (2006)
12. National Ethical Guidelines for Biomedical & Health Research involving human participants ICMR, New Delhi 2017
13. Guidelines for care and use of animals in scientific research. Indian National Science Academy, VMRF-DU Ph.D Research Methodology Syllabus 2019



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NewDelhi.

14. Research Methodology, methods and techniques by C.R.Kothari.(2009)
15. Basic epidemiology, 2<sup>nd</sup> Edition, R Bonita, R Beaglehole and T Kjellstrom(2007)
16. Statistical methods in medical research, 4th edition, P Armitage, G Berry and JNS Matthews. (2001)
17. Biostatistics: A foundation for analysis in health sciences, 9th edition, Wayne W Daniel (2008)
18. Computer fundamentals Pradip K. Singha and PritiSingha (BPBPublication)
19. The Internet: A users guide K. L. James (PHIpublication)
20. Internet Research skill (SAGE publication) Niall ODochartaigh
21. How to keep your Research Project on Track- Keith Town send -2018
22. Microsoft office system (PHIpublication)