

**SYLLABUS FOR Pre-Ph.D. COURSEWORK**  
**(For all subjects under the Faculty of Engineering & Technology)**  
**RESEARCH METHODOLOGY & COMPUTER APPLICATIONS**

1. Research Methods:

Topic 1: Introduction to research; Definitions and characteristics of research; Types of research; Main components of any research work.

Topic 2: Topic Selection: Learning Objectives; Problem identification; Criteria for prioritizing problems for research.

Topic 3: Analysis and Statement of the problem: Learning Objectives; Analyzing the problem; Formulating the problem statement.

Topic 4: Literature review: Uses of literature review; Source of information; Organization of information on index cards.

Topic 5: Objectives: Learning Objectives; Definitions; Formulation of the research objectives.

Topic 6: Research methodologies: Study population; Variables; Sampling; Sample size determination; Plan for data collection; Methods of data collection; Plan for data processing and analysis; Ethical considerations.

Topic 7: Work Plan; Major components and outline of the different phases in a research process; Summary of the major components of a research proposal; Fieldwork; Writing a research report.  
[16 hrs]

2. Quantitative Methods:

a) Statistics: Probability & Sampling distribution; Estimation, Hypothesis testing & application; Correlation & regression analysis.

b) Types of study designs/ Experiment design – Orthogonal array, ANOVA, interaction, Signal-to-Noise ratio, replication;  
[16 Hrs]

3. Computer Applications:

a. Spreadsheet tool: Introduction to spread-sheet applications, features & functions, using formulae & functions, data storing, features for statistical data analysis, generating charts/graphs & other features. [*Tools: Microsoft Excel, Open office and similar or other advanced tools*]

b. Presentation tool: Introduction to presentation tool, features & functions, creating presentations, customising presentation. [*Tools used: Microsoft Powerpoint, Open Office or any other tool*]

c. Web Search: introduction to internet, Use of Internet & www, using search engines using advanced search tools.

d. Thesis writing & Scientific editing tools. [8 Hrs]

References:

1. Montgomery, Douglas C. (2007) 5/e, Design and Analysis of Experiments (Wiley India)
2. Montgomery, Douglas C. & Runger, George C. (2007) 3/e, Applied Statistics & probability for Engineers (Wiley India)
3. Kothari C.K. (2004) 2/e, Research Methodology – Methods and Techniques (New Age International, New Delhi)
4. Krishnswamy, K.N., Shivkumar, Appa Iyer and Mathiranjani M. (2006) Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi)
5. The Complete reference Office Xp- Stephan L. Nelson, Gujulia Kelly (TMH)
6. Basic Computer Science and Communication Engineering – R. Rajaram (SCITECH)