Solapur University, Solapur

Ph.D. Course Work Syllabus

Paper I– Research Methodology and Information Communication Technology

(Common Paper for Faculty of Engineering & Technology)

Examination scheme: Theory paper: 100 marks (3 hrs duration)

Unit 1 - Basics of Research

Definition, objectives, motivation, types of research and approaches: descriptive research, conceptual, theoretical, applied and experimental.

Unit 2 - Formation of Research Problem

Research Process: To determine what type of research to be done, plan of research work, Selection of research area, prioritization of research.

Literature review: importance and methods, sources.

Objectives and scope of work, Developing Research Plan and Schedule: Scheduling Constraints, steps, problems in scheduling, limitations.

Unit 3 - Mathematical Modeling and Simulation

a) Modeling: Concept of modeling, classification of mathematical models, modeling with ordinary differential equations, difference equations, partial differential equations, graphs.

b) Simulation: Concept, types (quantitative, experimental, computer, fuzzy theory, statistical) processes of formulation of model based on simulation. Variables and measurement.

Unit 4 - Experimental Modeling

a) Definition of experimental design, examples, single factor experiments blocking and nuisance factors, guidelines for designing experiments.

b) General model of process: Input factors/ variables, Output parameters / variables controllable / uncontrollable variables, dependent / independent variables, experimental validity.

c) Introduction to Risk assessment, reliability, sustainability, and uncertainty

Unit 5 - Analysis of data

Types of data: parametric and nonparametric, descriptive and inferential data, collection of data: normal distribution, calculation of co-relation coefficient.

Data processing: Analysis, error analysis, meaning, different methods. Analysis of variance, significance of variance, analysis of covariance, multiple regressions, testing linearity / nonlinearity of model, testing adequacy of model. Introduction to data handling using software.

Unit 6 - Research Deliverables

Various forms of publications: Thesis, paper, research proposal.

Thesis writing: Introduction, Literature Review or State-of-the-art, Research approach (methodology), Results or findings, discussions, conclusions, scope for future work, references and appendices.

Presentation: Poster, thesis, proposal, and paper.

Unit 7 - Components of Information Communication Technology (ICT)

Impact factor, e-information

Patents: Agencies, National /International, procedure for filing, e-submission.

International publications: notes, letters/communications, full papers Review, h-index, Citation index.

Reference Books

1. C. R. Kothari, “Research Methodology”, Willy Estern Ltd. ND.
2. Wayne Goddard and Stuart Melville, “Research Methodology-An Introduction”, Juta & Co, Ltd, 2006
3. Lucienne T.M. Blessing, Amaresh Chakrabarti, “DRM, a Design Research Methodology,” Springer-Verlag London Limited 2009
4. Yogesh Kumar Singh, “Fundamentals of Research Methodology and Statistics,” NEW AGE INTERNATIONAL (P) LIMITED, PUBLISHERS
5. Douglas Montgomary, “Design of Experiments”
6. Willkinsion K.P. L., Bhandarkar, “Formulation of Hypothesis”, Himalaya publishing, Mumbai.
7. Schank Fr, “Theories of Engineering Experiments”, Tata McGraw Hill
8. Role of ICT in Doctoral Research- Capt. Dr. Nitin Sonaje, Aurther Press- New Delhi