

**MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL**

**COURSE WORK EXAMINATION: RESEARCH METHODOLOGY
PHYSICS**

UNIT I: WORKING ON A RESEARCH PROBLEM

Scientific research – An introductory approach – Research methods and techniques – Selection and formulation of research problem and Hypothesis – Research design – methods of collection of literature – access using internet web tools – e-journals – preparation of PPT and poster presentation – Style and format of thesis: Format for Table, Figure and footnotes – Use of Appendix and Bibliography.

**UNIT II:
STATISTICAL METHODS**

Measures of central tendency: meaning, characteristics, measures of central tendency, Arithmetic mean, Median, Mode, Geometric mean, Harmonic mean, and skewness – Distributions.

SOLUTIONS OF EQUATIONS

Determination of zeros of polynomials - Roots of nonlinear algebraic equations and transcendental equations – Bisection and Newton – Raphson methods – Convergence of solutions

UNIT III: LINEAR SYSTEMS

Solution of simultaneous linear equations – Gaussian elimination – Matrix inversion – Eigenvalues and eigenvectors of matrices – Power ad Jacobi Methods

UNIT IV : INTERPOLATION AND CURVE FITTING

Interpolation with equally spaced and unevenly spaced points (Newton forward and backward interpolations, Lagrange interpolation) – Curve fitting – Polynomial least – squares fitting .

UNIT V

Science and Ethics-Ethical theory and applications - Standards of Ethical Conduct in Science - Ethical Issues in Scientific Publication - Ethical issues in Laboratory - Academic Integrity: Avoiding Plagiarism and Understanding Research Ethics-plagiarism checker services.

BOOK FOR STUDY:

1. Santosh Gupta, Research Methodology and statistical techniques, Deep and deep Publications, 2005.
2. J.Anderson,B.H Durston, M.Poole, Thesis and assignment Writing, Wiley Eastern University 1998
3. Santosh Gupta, Research Methodology & Statistical techniques, Deep and Deep Publication 2005
4. B.C.Nakra, K.K.Chaudhry, Instrumentation, Measurement and Analysis, 2nd edition,Tata McGraw-Hill publishing Company Ltd, 2004

5. John R. Tayore, An Introduction to Error Analysis , University Science Books, 1982
6. Sastry, Introductory Methods of Numerical Analysis
7. V.Rajaraman, Computer oriented Numerical Methods, 3rd Ed. Prentice-Hall, New Delhi
- 8.M.K. Jain, S.R. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 3rd Ed. New Age International, New Delhi
- 9.F.Sccheild, Numerial Analysis, 2nd Edition, Schaum's Series McGraw-Hill
10. The ethics of science: an introduction – David B. Resnik, New York, 1998
11. What is Ethics in Research and Why is it Important?- David B. Resnik