

## Department of Physics, University of Jammu

**Course Code: PSPHTC702**

**Research Methodology**

**Credits: 04**

**Marks: 75**

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### UNIT: 1

**Research Problem:** Meaning of Research, objectives, types of Research, Research Approaches, Research and scientific method, Research method, Research Process, Criteria of Good Research, Problems in Pure Science, Problems in Applied Science.

**Searching the literature:** Necessity for research, structure of the scientific literature, cost of experiment, suggestions for searching.

### UNIT: 2

**Elementary Scientific Methods:** Authority in science, observation and description, cause and effect, Analysis and synthesis, Hypothesis deduction.

**The Design of Experiment:** Some first principles, variables, comparative versus absolute measurements, choice of sample.

**Technical Communications:** What is technical communication, factors to consider in the technical communication, Analyzing your audience, language and style — voice, sentence length, negatives tone, organisation and classification.

### UNIT: 3

**Meaning of Interpretation:** Techniques of interpretation. Precautions in interpretation. Significance of report writing, different steps in report writing, Layout of research report, format and types of report, Mechanics of writing research report, White papers, lab reports, Memorandums, memos and oral presentations.

### UNIT: 4

**Statistical Methods:** Measure of central Tendency: Arithmetic mean, median, mode, geometric mean, Harmonic mean, frequency distribution and histograms, Probability distribution (discrete and continuous distribution).

**Important Discrete Distributions:** Hypergeometric distribution, The binomial distributions, the Poisson distributions, the Pascal and related distributions.

**Important Continuous Distributions:** The normal distribution, the central limit theorem, exponential distribution, Gamma distribution, the Weibull distribution.



## UNIT: 5

**Measures of Variation in Statistical Methods:** Quartile Deviation, Average Deviation, Standard deviation, Coefficient of variation.

**Concept of Standard Error:** Statistical and systematic errors. Propagation of errors, chi square test for comparing variance, chi square test of goodness of fit, conditions of the application of chi square test. Important characteristics of chi square test. Simulation: introduction, need for simulation, types of simulation.

**Graphics:** Preparing graphics, General info on Graphics, Creating graphics (bar line graphs, pie charts), computer images (types).

## REFERENCES

- *Research Methodology: Methods and Techniques* by C.R. Kothari (New Age International Publishers).
- *Research Methodology* by R. Panneerselvam (Prentice-Hall of India).
- *Introduction to Statistical Quality Control* by Douglass and Montgomery (Wiley Publication, 4e).
- *Basic Communication Skills for Techniques* by Andrea J. Rutherford, 2e (Pearson Education Asia).

## NOTE FOR STUDENTS:

The question paper will be of 100 marks. The question paper shall comprise of 10 questions (of 20 marks each) with two questions from each unit. The students have to attempt one question from each unit.