



**UNIT 7: Statistics**

Concept of statistics, relevance in education, parametric and non-parametric data; graphical representation of data: histogram, frequency polygon, ogive and pie chart; Measures of Central Tendency: concept, computation and interpretation; measures of variability: concept, computation and interpretation; normal probability curve: concept, application and interpretation.

Correlation: concept, computation and interpretation- Product Moment, Rank Order, Biserial, Point Biserial, Phi, Contingency, Tetrachoric; significance of mean: concept, computation and interpretation of significance of t-test (correlated and uncorrelated, matched, paired-unpaired, matching- paired); ANOVA (One way) : concept, computation and interpretation, regression and prediction; chi square: concept, computation and interpretation (equal and normal probability).

**UNIT 8: Research Report**

Format of the research report Style of writing the report References and bibliography

**Reference books:**

1. Best John W. and James Kahn, V., 1989, Research in Education, Sixth Edition, Prentice-Hall of India Pvt.Ltd, New Delhi.
2. Sharma R.A., 1992, Fundamentals of Educational Research, Loyal Book Depot, Meerut, UP, India.
3. Kulbir Singh Sidhu, 1990, Methodology of Research in Education, Sterling Publishers Pvt. Ltd., New Delhi.
4. Lokesh Koul, 1997 Methodology of educational Research, third edition, Vikas Publishing House Pvt. Ltd. , New Delhi.
5. Kothari C.R., 1990, Research Methodology Methods and Techniques, Wiley Eastern Limited, New Delhi.
6. Borg Walter R., Gall Meridith D., 1983, Educational Research an Introduction, Fourth Edition, Longman, New York & London.
7. Nitko Anthony J., 1983, Educational Tests and Measurement an Introduction, Harcourt Brace Jovanovich, Inc., New York.
8. Aggarwal Y.P., 1988, Statistical Methods Sterling Publishers Pvt. Ltd., New Delhi.
9. Garret Hnery E., 1985 Statistics in Psychology and Education, Viakils, Feffer and Simon, Bombay.
10. Guilford, J.P., and Benjamin Fruchter, 1982 Fundamentals of statistics in Psychology and Education, Fifth edition, Mc Graw-Hill Book Company, New York.
11. Gupta S.C. and Kapoor V.K., 1999, Fundamentals of Mathematical Statistics, Sultan Chand & Sons Educational Publishers, New Delhi.
12. Grewal P.S., Methods of Statistics Analysis, Sterling Publishers Pvt. Ltd., New Delhi.
13. Bruce W. Tuckman, Statistics in Psychology and Education.

## Part-B (Subject Wise) Chemistry

### Physical Chemistry:

1. Basic principles and applications of quantum mechanics - hydrogen atom, angular momentum.
2. Variational and perturbational methods.
3. Basics of atomic structure, electronic configuration, shapes of orbitals, hydrogen atom spectra.
4. Theoretical treatment of atomic structures and chemical bonding.
5. Chemical applications of group theory.
6. Basic principles and application of spectroscopy - rotational, vibrational, electronic, Raman, ESR, NMR.
7. Chemical thermodynamics.
8. Phase equilibria.
9. Statistical thermodynamics.
10. Chemical equilibria.
11. Electrochemistry - Nernst equation, electrode kinetics, electrical double layer, Debye-Huckel theory.
12. Chemical kinetics - empirical rate laws, Arrhenius equation, theories of reaction rates, determination of reaction mechanisms, experimental techniques for fast reactions.
13. Concepts of catalysis.
14. Polymer chemistry, Molecular weights and their determinations. Kinetics of chain polymerization.
15. Solids - structural classification of binary and ternary compounds, diffraction techniques, bonding, thermal, electrical and magnetic properties
16. Collids and surface phenomena.
17. Data analysis.

## **Inorganic Chemistry**

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules.
3. Concepts of acids and bases.
4. Chemistry of the main group elements and their compounds. Allotropy, synthesis, bonding and structure.
5. Chemistry of transition elements and coordination compounds - bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements - spectral and magnetic properties, analytical applications. Shift reagents
7. Organometallic compounds - synthesis, bonding and structure, and reactivity. Organometallics in homogenous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation techniques. Spectroscopic electro- and thermoanalytical methods.
10. Bioinorganic chemistry - photosystems, porphyrines, metalloenzymes, oxygen transport, electron- transfer reactions, nitrogen fixation.
11. Physical characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mossbauer, UV-, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry - nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

## **Organic Chemistry**

1. IUPAC nomenclature of organic compounds.
2. Principles of stereochemistry, conformational analysis, isomerism and chirality.
3. Reactive intermediates and organic reaction mechanisms.
4. Concepts of aromaticity.
5. Pericyclic reactions.
6. Named reactions.
7. Transformations and rearrangements.
8. Principles and applications of organic photochemistry. Free radical reactions.
9. Reactions involving nucleophilic carbon intermediates.
10. Oxidation and reduction of functional groups.

11. Common reagents (organic, inorganic and organometallic) in organic synthesis.
12. Chemistry of natural products such as steroids, alkaloids, terpenes, peptides, carbohydrates, nucleic acids and lipids.
13. Selective organic transformations - chemoselectivity, regioselectivity, stereoselectivity, enantioselectivity. Protecting groups.
14. Chemistry of aromatic and aliphatic heterocyclic compounds.
15. Physical characterisation of organic compounds by IR, UV-, MS, and NMR.

#### **Interdisciplinary topics**

1. Chemistry in nanoscience and technology.
2. Green chemistry - Solvent free synthesis
3. Medicinal chemistry.
4. Supramolecular chemistry.
5. Environmental chemistry