



MOTHERHOOD
UNIVERSITY, Roorkee
ENLIGHTENING WORLD

Doctor of Philosophy (Ph.D.)
COURSE WORK SYLLABUS

FACULTY OF SCIENCES
(CHEMISTRY)

Implemented from June, 2017 onwards

Roorkee-Dehradun Road, Village Karoundi
Post Bhagwanpur, Tehsil Roorkee
District Haridwar, Uttarakhand

Compulsory Course - I

PAPER I- Research Methodology and Computer Applications

Section I: Research Methodology

Max. Marks: 100

((60 hrs) 6 Credits) (70 External+30 Internal)

Objective:

- To enable to student to understand and work methods and concepts related Research.
- To enable the student to develop research proposal and to work with research problem.
- To develop broad comprehension of research area.

UNIT –I : Concept of Research

10 hrs (20 Marks)

Meaning, Concept, nature steps types and characteristics of research., Types and approaches , Ethics in Research and Plagiarism, Scientific Inquiry, Philosophical and Sociological foundations of research, Interdisciplinary approach and its implications in various research area.

Unit II: Types and Methods of Research

10 hrs (20 Marks)

Qualitative and quantitative methods of research like Descriptive, Historical, Case study, Ethnography, Ex-post facto, documentary and content analysis, survey field and laboratory experimental studies. Characteristics of methods and their implications in research area.

Unit III: Development of research proposals

10 hrs (20 Marks)

Research proposal and its elements, Formulation of research problem-criteria of sources and definition, Development of objectives and characteristics of objectives, Development of hypothesis and applications.

Writing a Research Paper, Choosing a Topic, Preparing a Working Bibliography, Outlining and need to write a Research Paper

Unit IV: Methods of data collection & data analysis

10 hrs (20 Marks)

Concept of sampling and other concepts related to sampling. Probability and non-probability samples, their characteristics and implications. Tools of data collections, their types, attributes and uses. Redesigning, research tools-like questionnaire, observation, interviews, scales and tests etc.

Analysis of qualitative data based on various tools. Analysis of quantitative data and its presentation with tables, graphs etc. Statistical tools and techniques of data analysis-measures of central tendency, dispersion. Decision making with hypothesis testing through parametric and non-parametric tests.

Validity and delimitations of research findings.

Section II: Computer Applications

Unit V:

20 hrs (20 Marks)

Basic Knowledge of Computer, Use of Internet for Research Purpose: E-mail, WWW, Web browsing, acquiring technical skills, drawing inferences from data, Use of technology and other equipment in Research, Research publishing tool-MS Word, Adobe acrobat, Graphics tool-MS Excel, Presentation tool-MS Power, Data Analysis Software and Analysis Techniques point. Application of Internet in research : INFLIBNET, Use of Internet, sights (DOAJ), Use of E Journals, Use of E library, use of EBSCO HOST online database of Academic Libraries.

References:

- Best, J.W. (1995) & Kahan, J.V. – Research Education, Prentice Hall of India Pvt. Ltd., New Delhi.
- Edwards, A.L. (1960) – Experimental Design in Psychological Research, New York, Holts (revised Ed.).
- Ferguson, G.A. and Takane Yoshio (1989) – Statistical Analysis in Psychology and Education.
- Garrett, H.E. (1986) – Statistics in Psychology and Education, Vikils Feffers and Simmons Pvt. Ltd.
- Kaul Lokesh (1984) – Methodology of Educational Research, Vikas Publishing House Pvt. Ltd., New Delhi.
- Sukhiya, S. P. : Melhotra P.V., Elements of Educational Research, New Delhi, Allied Publishers.
- Tuckman, B.W. (1972) – Conducting Educational Research, Harcourt Brace, Javanovich.
- Verma, An Introduction to Educational and Psychological Research, Bombay, Asia Publishing House.
- Lindquist, E.F. (1960) – Elementary Statistical Methods in Psychology and Education, Oxford Book Company, New Delhi.
- Sharma, A.R. (1984) Fundamentals of Educational Research, Loyal Book Depot, Meerut.
- Sanders, D.H., Computer Today, NY: McGraw Hill, 1981
- Sinha, P.K., Computer Fundamentals, New Delhi: BPB Publications, 1992
- Cox, J. And Urban, P. “Quick Course in Microsoft Office. Galgotia Publications, New Delhi, 1990.
- Jain, Satish: “Introduction to Computer Science and basic Programming.” BPB Publications, New Delhi, 1990.
- Rajaraman, V., “Fundamental of Computers”, Prentice Hall of India, New Delhi, 1996.
- Saxena, S., “A First Coursein Computers”, Vikas Publishing House Pvt. Ltd., New Delhi, 1998.

**COURSE WORK SYLLABUS
CORE PAPER –II
CHEMISTRY**

Total Hours 60(6 Credits)

Max. Marks 100

UNIT – I

Electro analytical Techniques, Polarography:- Introduction and Basic Principles, Polarograph, Polarographic cells, Half wave Potential and its significance., DME:- Advantages and Disadvantages of DME, SCE, Carbon electrodes-Carbon paste Electrode, Types of Currents:- Diffusion Current, Migration Current, Kinetic Currents,

UNIT – II

Nanomaterials:- Definition, Methods of Preparation, Properties of Nanomaterials:- Physico-chemical and optical, Electrical and Electronics properties.Phosphorescent Materials. Luminescence, Types of Luminescence, Fluorescence, Phosphorescence, Frank Condon Principle, Jablouski diagram, Organic Electroluminescence, Organic Light Emitting diode, Structure and working of OLED, Applications of OLED.

UNIT - III

Thermodynamics of liquid mixtures, Molecular interactions in liquid mixtures: Ion-ion interactions, Ion-dipole interactions, Dipole-dipole interactions, Ion-induced dipole interactions, Dipoleinduced dipole interactions, Quadruple-octuple interactions; specific interactions, hydrogen bonding, charge-transfer interactions and contact charge-transfer interaction. Quantum mechanics: The Born-Oppenheimer approximation, The Hellmann-Feynman theorem, Huckel molecular orbital (HMO) theory.

UNIT – IV

Electrodics: Electron transfer under an interfacial electrical field; Butler-Volmer equation; electrode kinetic involving semiconductor solution interface; photoelectrochemistry; p-type photo-cathodes; n-type photo-anodes; Rate determining step in photo-electrochemical reaction; Ionic conductivity in solids; Solid electrolytes; Fast-ion conductors, oxygen ion conductors, sodium ion conductors; Solid state ionic devices, Batteries: Lithium batteries; Sodium batteries; fuel cells; sensors.

UNIT - V

Stereo selective Synthesis, Principle of stereo selectivity, 1,2- and 1,3-asymmetric induction, acyclic stereoselection, distereoselection in cyclic systems. Enantioselective synthesis: Enantioselective hydroboration, hydrogeantion, epoxidation, enantioselective synthesis via hydrazones. Role of enzymes in chiral synthesis. Disconnection approach of synthesis: Introduction, main synthetic strategies, Synthetic strategies of 1,2- and 1,4-difuntionalised compounds, Group disconnection, Umpolung Strategies, α - functionalisation of carbonyl compounds.

UNIT – VI

Heterocyclic compounds: General synthesis of (a) compounds with three or more heteroatoms in the ring (1,2,3)- and (1,2,4)-triazoles (1,2,4)- and (1,3,4)-oxadiazoles (1,2,5)- and (1,3,4)-thiadiazoles (1,2,3)-, (1,2,4)- and (1,3,5)-triazines. Tetrazoles and tetrazines. Green Chemistry: Basic principles of green chemistry, Application of non-conventional techniques in organic synthesis (ultrasonic, microwave and grinding). Solid state synthesis and synthesis under solvent free conditions. Use of ionic liquids. Drug discovery and development A rational approach to drug design and drug development of following drugs: cimetidine oxamniquine.

Books recommended:

- Asymmetric Synthesis Ed. J. D. Morrison, vol. 1-5. Academic Press.
- Stereochemistry of Organic Compounds by D. Nasipuri.
- Designing organic synthesis by S. Waren.
- Heterocyclic Chemistry by T. L. Gilchrist.
- Comprehensive Heterocyclic Chemistry by A. R. Katritzky and C. W. Rees.
- Green Chemistry by M. Kidwai and V. K. Ahluwalia.
- Wilson and Gisvold's Text Book of organic medicinal and pharmaceutical chemistry Ed. R. F. Dorge.