

**Various Chemistry**

**Courses offered in**

**B.Tech. Programme**

**by**

**Department of**

**Applied Chemistry**



महात्मा ज्योतिबा फुले  
रुहेलखण्ड विश्वविद्यालय, बरेली

**M. J. P. Rohilkhand University**

**Bareilly- 243006, U.P**

**B. TECH I YEAR I SEMESTER (EC, EI& EE BRANCH)**  
**B. TECH I YEAR II SEMESTER (CS, CH& ME BRANCH)**

**CHEMISTRY-I**  
**CREDIT: 04**

**SUBJECT CODE: - CY-101T**  
**TOTAL CONTACT HOURS: 40**

**PO-** It describes various topic of Engineering Chemistry

**CO-** After graduation Students will understand the Schrodinger equation, chemical Kinetics, periodic tables and properties with the basics of Organic Chemistry.

**Schrödinger equation:** Origin of quantization; applications of particle in a box problem; hydrogen atom; properties of atomic orbitals; many electron atoms; molecular orbital theory; bonding and intermolecular forces.

**Thermodynamics:** Fundamental definition and concepts of thermodynamics; Work, heat and energy; First law: Cp and Cv; Second law: entropy; Helmholtz and Gibbs Energy; chemical potential; Third law; phase equilibria; chemical equilibrium.

**Chemical kinetics:** Rate laws; elementary reaction and chain reaction. Periodic table and periodic properties: basis of periodic table, trends in size, electron affinity, ionization potential and electro negativity, Use of Ellingham diagram and thermodynamics in the extraction of elements; Transition metal chemistry: inorganic complexes, isomerism, nomenclature; bonding in transition metal complexes; valence bond and crystal field theory, magnetism, bonding aspects, structural distortion; Bioinorganic chemistry: storage and transport proteins; Catalysis: hydrogenation, hydroformylation and olefin metathesis.

**Organic Chemistry:** Hückel treatment of ethylene, butadiene and benzene, concept of aromaticity, configuration, molecular chirality and isomerism, conformation of alkanes and cycloalkanes, reactivity of carbonyl groups (additions, addition- eliminations, reactions due to acidic proton, reactivity of acid halide, ester and amide), functional group inter-conversions involving oxidation and reduction. Introduction to bio-organic chemistry: carbohydrates, amino acids proteins and nucleic acids. Polymer chemistry: definition, classification of polymers, orientation of polymers, types of polymerization, Mechanism of addition and condensation polymerization, thermo plastic and thermo setting resins: Important thermosetting and thermoplastic polymers: eg. Bakelite, polyester, cellulose derivatives, PVC, Poly ethylene, Teflon, Polystyrene, Nylon Natural and synthetic rubbers.

**Suggested Books (Latest Editions)**

1. P.W. Atkins, Physical Chemistry (7th Edition), Oxford University Press, 2006.
2. D.A. McQuarrie and J.D. Simon, Physical Chemistry -A Molecular Approach, Viva Books Pvt. Ltd., 1998.
3. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice Hall of India Pvt. Ltd., 5th Ed, 1990
4. G. Solomons and C. Fryhle, Organic Chemistry, John Wiley & Sons (Asia) Pte Ltd.
5. J.D. Lee, Concise Inorganic Chemistry, (5th Edition), ELBS, 1996.
6. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, Oxford University Press, 2006
7. F. W. Bill Mayer, Polymer Science, Tata McGraw Hill. 8. A Levine, Physical Chemistry, McGrawHill, 2009

**CY-101P: CHEMISTRY LAB (I SEMSETER: EC, EI& EE BRANCH; II SEMESTER: CSIT, CH& ME BRANCH)**

**B. TECH I YEAR II SEMESTER (EC, EI&EE BRANCH)**  
**B. TECH I YEAR I SEMESTER (CS, ME&CH BRANCH)**

**ENVIRONMENTAL STUDIES**  
**CREDIT: 04**

**SUBJECT CODE: - CY-103T**  
**TOTAL CONTACT HOURS: 40**

- PO-** This involves the environment based studies to make the students well aware about the environment and sustainability, Pollution and pollutants etc.
- CO-1-** It will let the students aware about environmental and the knowledge to protect it and keep it clean and free from pollution
- CO-2-** It will explain Environmental policies and legislation.
- CO-3-** It will give knowledge about Global issues including climate changes

Multidisciplinary nature of environmental studies, Ecosystems, Biodiversity and its conservation, Indicators of environmental pollution, Environment and human health.

Consumption of natural resources and environmental degradation of forests, water, coal, minerals, energy, and land. Sustainable development, Environmental policy and legislation, Environmental impact assessment.

Pollution of lakes, rivers, ground water, coasts, and oceans, Science and technology for drinking water and wastewater treatment and issues in management of systems.

Solid and hazardous waste management: causes, effects and control measures.

Air and noise pollution, science and engineering of pollution control, Global Issues including climate change, global warming, acid rain, ozone layer depletion, nuclear hazards, Disaster management, industrial accidents, floods, earthquakes, cyclones and landslides, Greenhouse effect etc.

**SUGGESTED BOOKS (Latest Editions)**

1. W.P. Cunningham and M.A. Cunningham, Principles of Environmental Science
2. Tata McGraw-Hill Publishing Company, New Delhi.
3. J.A. Nathanson, Basic Environmental Technology, Prentice Hall of India, New Delhi.
4. S.J. Arceivala, and S.R. Asolekar, Wastewater Treatment for Pollution Control and Reuse (3rd Edition), Tata McGraw Publishing Co. Ltd., New Delhi.
5. S.R. Asolekar, and R. Gopichandran, Preventive Environmental Management: An Indian Perspective, Foundation Books Pvt. Ltd., New Delhi. Some selected book-chapters, monographs and journal paper.

**B.TECH. II YEAR (CHEMICAL BRANCH)**

**SUBJECT: APPLIED ORGANIC CHEMISTRY**  
**CREDIT: 04**

**SUBJECT CODE: CY-201**  
**TOTAL CONTACT HOURS:40**

- PO- It give explicit information about Structure activity relationship (SAR), Nucleophilic substitution reactions, Heterocyclic Chemistry, Organic Catalysis, Organic reagents.
- CO-1- It will be explaining the SAR of various drugs to understand the designing and development of drug molecules.
- CO-2- It will be helpful in understanding the Chemistry of Polymers
- CO-3- It explains about many organic reagents and their applications in organic synthesis

- 1. Structure Activity Relationship:** Structure Activity Relationship (SAR) in simple organic molecules like salicylic acid analogs, P-aminophenols analogs, barbiturates etc.
- 2. Nucleophilic substitution reactions:** Aliphatic nucleophilic substitution, aromatic nucleophilic substitution, mechanism and factors affecting nucleophilic substitution.
- 3. Dienes & Polyenes:** Nomenclature, preparation and important reactions like cycloaddition reactions.
- 4. Chemistry of Polymers:** Polymerization and some commercially important polymers: Thermoplastic and thermosetting resins, fibres, rubbers etc.
- 5. Heterocyclic Chemistry:** Introduction to heterocyclic chemistry including synthesis, reactivity and application mainly 3,4,5,6-membered rings containing NSO as hetero atom eg Pyrrole, Furan, Thiophene and Pyridine.
- 6. Organic Catalysis:** Catalysis involving transition metal complexes with examples eg. Lindler's Catalyst.
- 7. Pericyclic reactions:** Electrocyclic reactions, Sigmatropic reactions, cycloaddition reactions, their mechanism & stereochemistry with the help of suitable examples.
- 8. Organic reagents:** Preparation, properties and uses of few important reactions namely: sodium borohydride, Lithium aluminium hydride, N-bromo-succinimide, Lead tetraacetate, Diazomethane, Aluminium isopropoxide, Grignard reagent etc.

**Recommended Books (Latest Editions):**

1. Organic Chemistry: Morrison and Boyd
2. March's Advanced Organic Chemistry: Jerry March
3. Reaction Mechanism: Peter & Sykes
4. Foye's Principles of Medicinal Chemistry: Foye et al
5. Engineering Chemistry: S.S. Dara

**B.TECH.VII SEMESTER IV YEAR  
OPEN ELECTIVE**

**Subject: Polymeric Materials and Their Applications**  
**Credit-4**

**Code: CY-401T**  
**L T P: 3 1 0**

- PO-I** To have in-depth knowledge of Polymeric materials and their applications.  
**CO-1-** It leads to develop better understanding about basics of polymer chemistry.  
**CO-2-** it will enable to understand resins, plastic, rubbers, Biopolymers and their applications

- 1. Basic Polymer Chemistry:** Definition, Classification, Types of polymerization.
- 2. Resins and Plastics:** Thermoplastic and thermosetting resins, constituents of plastics, fabrication of plastic materials, Important resins, Cellulose derivatives, Polyethylene, Teflon, Polystyrene, Polyvinylacetate, PVC, Nylons, Phenolic resins Phenol Formaldehyde, Urea and Malamine-Urea and melamine-Formaldehyde resins, Epoxy resins, Polyester, Silicones, Ion exchange resins.
- 3. Rubbers/Elastomers:** Natural rubber, compounding of rubber, Properties, uses, reclaimed rubber, Synthetic rubber, Buna-S, Nitrile rubbers, Fibre reinforced plastics (FRP).
- 4. Biopolymers:** Importance and applications of few important biopolymers eg. Proteins, carbohydrates etc.

**Texts/References (Latest Editions):**

1. V. K. Ahluwalia, M. Kidwai, New Trends in Green Chemistry, Anmaya Pub.
2. A. Matlack, Introduction of Green Chemistry, CRC.
3. F. W. Billmeyer, A Text book of Polymer Science, Wiley.
4. V. R. Gowarikar, Polymer Science, New Age Pub.