



## Chemistry

### BEG104SH

Year: I

Semester: II

Teaching Schedule Hours/Week			Examination Scheme				Total Marks	Remarks		
			Final		Internal Assessments					
			Theory		Practical				Theory Marks	Practical Marks
L	P	T	Duration	Mark	Duration	Mark				
3	2	1	3	80	-	-	20	25	125	

**Course Description:** This course on Chemistry deals with some advanced topics that have practical use in Civil Engineering. The course syllabus has been divided into three parts. First part deals with physical chemistry. Second and third part respectively deals with inorganic and organic chemistry.

**Catalogue Description:** Atomic Structure, Chemical Bonding, Electro chemistry, Transition Elements, Types of Organic Reaction, Stereo chemistry, Polymers and Polymerization.

**Course Objective:** By the end of this course, students will be able to-----

- Enhance their knowledge in physical, inorganic and organic chemistry
- Acquire knowledge on Environmental Chemistry
- Know the types of organic reactions
- Understand Polymers and Polymerization

**Course Outline:**

- 1 **Atomic Structure** (7 Hrs)
  - 1.1 Diffraction Concept
  - 1.2 Schrodinger's wave equation
  - 1.3 Quantum Numbers
  - 1.4 Aufbau Principle
  - 1.5 Pauli's Exclusion Principle
  - 1.6 Stability of Noble Gas
  
- 2 **Chemical Bonding** (6 Hrs)
  - 2.1 Electrovalent Bond
  - 2.2 Metallic Bond
  - 2.3 Crystal Lattice
  
- 3 **Electrochemistry** (6 Hrs)
  - 3.1 Ostwald's Dilution Law
  - 3.2 pH and pH Scale
  - 3.3 Buffer and its Functioning
  - 3.4 Electrolytic and Galvanic Cells
  - 3.5 Nernst Equation
  - 3.6 Corrosion of Metals





- 4 **Coordination Complexes** (5 Hrs)  
4.1 Coordination Compound  
4.2 Werner's coordination theory  
4.3 Nomenclature of coordination complexes  
4.4 Electronic Interpretation of Coordination  
4.5 Valence Bond Theory
- 5 **Transition Elements** (5 Hrs)  
5.1 Transition elements and periodic table  
5.2 Characteristic and Properties of Transition Metal  
5.3 Complex Formation and Magnetic Properties  
5.4 Color Formation
- 6 **Types of Organic Reaction** (6 Hrs)  
6.1 Substitution Reaction  
6.2 Addition Reaction  
6.3 Elimination Reaction  
6.4 Rearrangement Reaction
- 7 **Stereochemistry** (3 Hrs)  
7.1 Optical and Geometrical Isomerism  
7.2 Racemic Modification
- 8 **Organometallic Compounds and Explosives** (3 Hrs)  
8.1 Preparation, properties and uses of Grignard Reagent  
8.2 Preparation, properties and action of Explosive
- 9 **Polymers and Polymerization** (4 Hrs)  
9.1 Polymers and their type  
9.2 Synthetic and Natural Polymers  
9.3 Synthetic Fibers

**Laboratory Works:**

1. To determine the alkalinity of the given sample of water (Two Labs).
2. To determine the total hardness of water sample.
3. To determine the permanent hardness of water sample.
4. To determine the amount of free chlorine in the given sample of water.
5. To determine the condition in which corrosion takes place.
6. To measure the quantity of charge required to deposit one mole of copper.
7. To determine the iron from Mohr's copper.

**Reference Books:**

- 1) Selected topics in Physical Chemistry- Motikaji Sthapit
- 2) Principles of Physicals Chemistry- Marron & Prutto
- 3) Essentials of Physical Chemistry- Bahl & Tuli
- 4) Advanced Inorganic Chemistry – Satyaprakash, R. D. Madan, G. D. Tuli
- 5) Concise Chemistry- J. D. Lee
- 6) Organic Chemistry- Morrison & Boyd
- 7) Organic Chemistry – B. S. Bahl