

Course Title : <b>DSC: GENERAL PHYSICAL CHEMISTRY, w.e.f. the session 2025-26 and onwards</b>	
Class B.Sc : PT.IV / SEM VII	COURSE CODE : BCH-C 703
Lecture: 60	Credits: 04
MM: 70	Exam Hr : 03

**NOTE:** The question paper shall consist of Two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer (about 150 words) type questions of SIX marks each and student shall be required to attempt any five questions. Sec.-B shall contain 08 descriptive type questions of TEN marks each and student shall be required to attempt any four questions. Both sections shall have questions from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

**Chemical Kinetics - I:** Derivation of IIIrd order kinetic equation, collision theory for uni, bi and termolecular reactions, Steric factor, Theory of absolute reaction rates, Entropy of activation. Experimental techniques for the study of kinetics of slow and fast reactions. Potential energy surfaces (two-dimensional and 3-dimensional diagrams), P.E. surface for  $H + H_2$  reaction, Concept of COL and Contour diagram.

(10 Lectures)

**Chemical Kinetics - II:** Opposing, Consecutive, Side and Induced reactions, Induction period. Chain reactions and explosion limits. Reactions in solution, Factors affecting the rates in solutions, effect of solvation and Internal pressures, Double and Single sphere models, Effect of ionic strength, Bronsted-Bjerrum equation, Numerical Problems. (10 Lectures)

**Linear Free energy Relationships:** Effect of substituents on reaction rates, Basic idea of linear free energy relationships particularly Hammett, Taft, Brown and Okamoto, Sekigawa and Van - Bakkum plots (Introductory treatment only). (10 Lectures)

**Catalysis:** Acid- Base catalysis, Acidity function, Enzyme -catalysis, Michaelis-Menten equation.

**Photochemistry:** Jabolinskii diagram, fluorescence, phosphorescence, chemiluminescence and photosensitization, photophysical kinetics of unimolecular process. (10 Lectures)

**Macromolecules :** Explaining the terms Isotactic, Atactic, Syndiotactic, Copolymers, Block copolymers, Linear, Branched and Cross linked polymers, Addition and condensation polymerisation. Degree of polymerisation and length of polymer chains. Requirement of purity for synthesis. Molecular weights and their distribution. Polydispersity. Determination of molecular weight by Osmotic pressure, Viscosity, light scattering and sedimentation equilibrium methods. (10 Lectures)

**Suggested Readings :**

1. Chemical Kinetics by: K.J. Laidler
2. Enzyme Kinetics by: D.V. Roberts
3. Text book of Physical Chemistry by: S. Glasstone
4. Chemical Kinetics by: Ralph Jr. Westron and A.S. Harold
5. Physical Chemistry by: G.M. Barrow
6. Physical Chemistry by: G.W. Castellan
7. Introductory Polymer Chemistry by: G.S. Misra
8. Physical Organic Chemistry by: N.S. Issacs

**Course objective**

1. To enable student to identify a problem chemical kinetics reaction and experimental technique and potential energy diagram
2. Understanding of students photochemical reactions problem
3. Understanding of students Effect of substituents on reaction rates

4.To learn student preparation of macromolecule

**Course out comes (Cos)**

CO:1 Helped students in attaining basic concepts with a balanced knowledge of chemical kinetics.

CO:2 Created awareness about kinetic study of different types of chemical reaction and developed the mechanism for better industrial employment.

CO:3 Developed interest among students for physical chemistry and its application in various measurements and monitoring techniques of catalyst.

CO:4 Upgrade students' knowledge about basic concepts of effect of substituents on reaction rates and its applications in organic laboratories.

CO:5 Developed and enhanced knowledge about the introduction to photo chemistry and skills for its fluorescence, phosphorescence, chemiluminescence and photosensitization system.

CO:6 Created awareness about the macromolecules.

CO:7 Created the skill in students in macromolecules or polymer chemistry.

CO:8 Created chemical knowledge in Vedic chemistry with catalysis process

**Mapping of course Outcomes (COs) with program outcomes (POs)**

Course Outcomes/Program outcomes	1	2	3	4	5	6	7	8
CO:1	X				X			X
CO:2				X				X
CO:3	X		X					
CO:4		X		X			X	
CO:5				X				X
CO:6	X				X			
CO:7		X	X				X	
CO:8						X		

Note: put 'X' in relevant column of the mapping