

**SEMESTER-I**  
**Physical chemistry**

Time: 3 Hrs.

M.M. 100 marks

Note: The paper will be divided into two sections.

**Section-A** M.C.Q.50 (10 from each section)

**Total-50 marks**

**Section-B:** Two questions are from each unit will be asked with internal choice and the candidate is required to attempt five questions.

**Total-50 marks**

**Unit I**

**Thermodynamics:** partial molar free energy, partial molar volume and partial molar heat content. Their significance and determination. Concept of fugacity and variation with temperature and pressure. Determination of fugacity by graphical method and in gas mixtures (Lewis Randall rule). Activity and activity coefficient. Debye Huckel theory for activity coefficient of electrolyte solution. Determination of activity and activity coefficients.

**Unit II**

**Chemical kinetics :-** Theories of reaction rates, Activated Complex Theory (Equilibrium and statistical), Theory of Unimolecular reactions (Lindemann and Hinshelwood treatments). General features of fast reactions; study of fast reaction by flow method. Relaxation, flash photolysis and magnetic resonance method.

**Unit III**

**Surface Chemistry :-** surface tension and surface free energy, Young and Laplace equation, Kelvin Equation. Gibbs Adsorption isotherm. The B.E.T. equation and determination of surface area. Method of determining surface structure and composition by SEM, LEED, AES and PES. Kinetics of gaseous reactions on solid surfaces (unimolecular and bimolecular)

#### **Unit IV**

**Micelles:** - surface active agents, classification of surface active agents, micellization, critical micelles concentration (CMC) factors affect the CMC of the surfactants , thermodynamics of micellization, micro-emulsion, reverse micelles.

**Colloidal state:-** Defining and classification of colloids. Sol, gel and emulsions; preparation and properties. Application of colloids.

#### **Unit V**

**Chemical equilibrium :-** free energy and entropy of mixing, partial molar quantities, Gibbs – Duhem equation, Equilibrium constant, temperature – dependence of equilibrium constant , phase diagram of one and two component system, phase rule.

#### **Recommended Books:**

1. Physical chemistry :Puri, Sharma, Kalia