Gujarat Technological University

B.Pharm Semester-II

Physical Pharmacy

(3 hours/week, 3 credits, 45 hours)

1. **States of Matter:** **5**
   Introduction, binding forces between molecules, states of matter-solids, liquids, gases, liquid crystals, glassy state, phase equilibrium and phase rule, condensed systems

2. **Buffers:** **3**
   Buffer equation, buffer capacity, buffers in pharmaceuticals systems, preparation, stability, buffered, isotonic solutions, tonicity calculations, and methods of adjusting isotonicity.

3. **Solubility and Distribution Phenomenon:** **7**
   General principles, solvent-solute interactions, solubility of gases in liquids, solubility of liquids in liquids, solubility of solids in liquids, distribution of solutes between immiscible solvents.

4. **Surface and Interfacial phenomenon:** **6**
   Liquid interface, adsorption at liquid interfaces, adsorption at solid interface, applications of surface active agents, electrical properties of interfaces.

5. **Disperse systems:** **10**
   a. Colloidal dispersions: Definition, types, properties of colloids, protective colloids, applications of colloids in pharmacy.
   b. Suspensions and Emulsions : Interfacial properties of suspended particles/globules, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicle, rheological considerations, emulsions ; types, theories, physical stability.

6. **Micromeritics:** **8**
   Particle size and distribution, methods for determining particle size, particle shape and surface area, methods for determining surface area, derived properties of powders.

7. **Rheology :** **6**
   Newtonian system, Non-Newtonian systems, thixotropy in formulation, determination of rheological properties, applications in pharmacy.

Physical Pharmacy

PRACTICALS

(3 hours/week, 3 credits, 45 hours)

Practicals demonstrating any theoretical aspects of above topics may be carried out.

Experiments on application of phase rule, two component systems, estimation of buffer capacity, preparation of various buffer solutions and their use, experiments on tonicity adjustment, Solubility determination of solids. Determination of surface / interfacial tension, HLB value and CMC of surfactants. Estimation of partition coefficient, Determination of viscosity using different viscometers, Demonstration of Brookefield viscometer, Determination particle size and surface area, derived properties of powders like density porosity, compressibility angle of repose etc. Study on polymorphs, their identification & properties. Studies of different types of colloids and their properties, Determination of sedimentation parameters for suspensions and emulsions, work done in emulsification, etc.

Books Recommended:

1. Martin's Physical pharmacy by Patrick J. Sinko, 5th edition, Lippincott Williams & Wilkins, New York, 2006.
2. Pharmaceutics: The Science of Dosage Form Design, 2nd edition, Aulton, Michael E., Chrchill Livingstone, London, 2002.
3. Remington: The Science and Practice of Pharmacy, Vol-I & II, 20th edition, Gennaro, Alfonso R.,Lippincott Williams & Wilkins, New York, 2002.
4. Physicochemical Principles of Pharmacy, 3rd edition, Florence, A. T. Atwood, D. Macmillan Press Ltd., London 1998.
5. Pharmaceutical Dosage Forms and Drug Delivery Systems, Ansel, Howard. C., Allen, Loyd V., Popovich, Nicholas G. Lippincott Williams & Wilkins, New York, 2002.
6. Cooper and Gunn's Tutorial Pharmacy, ed. Carter, S. J., 6th edition, CBS Publishers & Distributors, Delhi, 2000.
7. Bentley's textbook of Pharmaceutics by E. A. Rawlins