Program	Bachelor of Pharmacy (BPharm)	**Semester - 3**
Type of Course	-	
Prerequisite		
Course Objective	-	
Effective From A.Y.	2023-24	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		
Lecture	Tutorial	Lab	Credit	External Marks (T)	Internal Marks (T)	External Marks (P)	Internal Marks (P)	Total Marks
3	1	4	6	75	25	35	15	150

SEE *- Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**UNIT I**	10	22
	1. **Solubility of drugs:** Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications		
2	**UNIT-II**	10	22
	1. **States of Matter and properties of matter:** State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid- crystalline, amorphous & Polymorphism 2. **Physicochemical properties of drug molecules:** Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications		
3	**UNIT-III**	10	22
	1. **Surface and interfacial phenomenon:** Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid		
4	**UNIT-IV**	8	18
	1. **Complexation and protein binding:** Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.		
5	**UNIT-V**	7	16
	1. **pH, buffers and Isotonic solutions:** Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	15	20	15	30

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Knowledge about various physical and physicochemical properties in the formulation development
CO2	Knowledge and applications of basic principles and concepts of solubility
CO3	Knowledge and applications of basic principles and concepts of surface and interfacial phenomena
CO4	Knowledge and application of basic principles and concepts of complexation, buffers and isotonicity in drug product design
CO5	Ability to use physicochemical properties in the formulation development and evaluation of dosage forms

Reference Books

1.	**MARTINS PHYSICAL PHARMACY AND PHARMACEUTICAL SCIENCES** By PATRICK J. SINKO | LIPPINCOTT WILLIAMS AND WILKINS | 5, Pub. Year 1993
2.	**ESSENTIALS OF PHYSICAL PHARMACY (TextBook)** By CVS SUBRAMANYAM | VALLABH PRAKASHAN | 2, Pub. Year 2017
3.	**PHYSICAL PHARMACEUTICS (TextBook)** By DR. R. MANAVALAN AND DR. C. RAMASAMY | PHARMAMED PRESS | 9, Pub. Year 2018
4.	**PHYSICAL PHARMACEUTICS (TextBook)** By CVS SUBRAMANYAM | VALLABH PRAKASHAN | 2, Pub. Year 2014
5.	**Pharmaceutical Dosage Forms: Tablets 1 - 3** By Herbert Lieberman, Leon Lachman, Joseph B. Schwartz | CRC Press | 2, Pub. Year 1989
6.	**Pharmaceutical Dosage Forms: Disperse Systems Volume 1-2** By Herbert A. Lieberman, Martin M. Rieger Gilbert S. Banker | Marcel Dekker Inc | 2
7.	**Laboratory Manual of Physical Pharmaceutics (TextBook)** By C.V.S Subrahmanyam et al | VALLABH PRAKASHAN
8.	**Theory and practice of of Physical Pharmacy** By Gaurav Jain & Roop K. Khar | Elsevier

List of Practical

1.	To determine solubility of given drug at room temperature.
2.	To determine solubility of given drug at different temperature.
3.	To determine solubility of KCl at different temperature.
4.	To determine solubility of benzoic acid in different solvents.
5.	To determine partition coefficient of benzoic acid in benzene and water.
6.	To determine buffer capacity and dissociation constant pKa of acid.
7.	To determine upper consolute temperature of phenol water system.
8.	To study the effect of third component on upper consolute temperature of phenol water system.
9.	To study phase behavior of three component system.
10.	To determine surface tension of given sample using Ostwald’s stalagmometer.
11.	To determine interfacial tension of benzene and toluene using Ostwald’s stalagmometer.
12.	To determine the surface tension of given sample of liquid by drop weight method using Ostwald’s stalagmometer.
13.	To determine critical Micelle concentration of given surfactant.
14.	To verify Freundlich adsorption isotherm and determine ‘k’ and “b”
15.	To determine HLB value of given surfactant.

List of Tutorial	
1.	Solubility of gases in liquids
2.	Solubility of liquids in liquids
3.	Solubility of solids in liquids
4.	States of matter Solid state
5.	State of matter- Liquid and Gaseous state
6.	Physicochemical properties of drug molecules
7.	Surface & interfacial tensions
8.	Adsorption at liquid interfaces
9.	Adsorption at solid interface
10.	Classification of Complexation
11.	Methods of analysis of complexation
12.	Protein binding
13.	pH and Determination of pH
14.	Buffer equation
15.	Buffered isotonic solutions