



SYLLABUS

Course Title	PHYSICAL PHARMACEUTICS	
Course Code	PH223	
Course Credit	Lecture	: 3
	Practical	: 2
	Tutorial	: 0
	Total	: 5
Course Objectives		
<p>On the completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ▪ Discuss the importance of various physical properties of material in manufacturing processes. ▪ Study the principle, theory, mechanism, working and construction of equipments used for different evaluation processes ▪ Simplify the physical pharmaceutics with more practical orientation. ▪ Apply the various principles in solving practical problems including numerical treatment. 		
Detailed Syllabus		
Sr. No.	Name of Chapter & Details	Hours Allotted
	Section-I	
1	<p>States of Matter:</p> <p>State of matter, change in the state of matter, latent heats and vapor pressure, binding forces between molecules, phase equilibrium and phase rule, condensed systems, sublimation-critical point, Eutectic mixtures, gases, aerosols-inhalers,</p>	08

	relative humidity, liquid, complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism.	
2	<p>Surface and Interfacial Phenomenon:</p> <p>Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents and its application, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid-gas and solid-liquid interfaces, complex films, electrical properties of interface.</p>	07
3	<p>Micromeritics and Powder Rheology:</p> <p>Particle size and distribution, average particle size, number and weight distribution, particle number.</p> <p>Methods for determining particle volume and size- optical microscopy, sieving, sedimentation; measurements of particle shape, specific surface area; methods for determining surface area; permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.</p>	08
	Section-II	
4	<p>Rheology:</p> <p>Newtonian systems: Law of flow, kinematic viscosity, effect of temperature</p> <p>Non-Newtonian systems: pseudoplastic, dilatant, plastic; thixotropy, thixotropy in formulation, negative thixotropy, determination of rheological properties, capillary, falling ball, rotational viscometers, Application in pharmacy.</p>	08
5	<p>Dispersion Systems:</p> <p>Colloidal dispersions: Definition, types, properties of colloids, protective colloids,</p>	14

applications of colloids in pharmacy.

Suspensions and Emulsions: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian motion, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations, Emulsions-types, theories, physical stability.

Physical Pharmaceutics (Practical)

1. Determination of derived properties of powders like density, porosity, compressibility, angle of repose etc.
2. Effects of glidant on the flow properties of given powder.
3. Optimum conc. of glidant.
4. Determination of surface, interfacial tension, HLB value, and critical miscelle concentration of surfactant.
5. Studies of different types of colloids and their properties.
6. Preparation, identification and stability studies of emulsion.
7. Work done in emulsification and rate of creaming.
8. Preparation of suspension and determination of their sedimentation parameters.
9. Mutual solubilities of given liquids (Phenol, Water) and find out Upper consolute temperature (UCT).
10. Viscosity using diff. Viscometer.
11. Molecular weight of polymer by viscosity measurement.
12. Other practicals covering syllabus aspect.

Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Specific discussion questions will be assigned each week.

- Each unit will have review questions to measure the student's understanding of the material.

Students Learning Outcomes:

At the end of the course the students will be able to:

- Study the working and construction of equipments used for different evaluation processes
- Apply the various principles in solving practical problems.

Text books:

1. Martin's Physical pharmacy: Patrick J. Sinko; Lippincott Williams & Wilkins, New York, 2006.
2. Pharmaceutics - The Science of Dosage Form Design: Aulton Michael E, Churchill Livingstone, London, 2002.
3. Pharmaceutical Dosage Forms and Drug Delivery Systems: Ansel, Howard, Allen Loyd, Popovich Nicholas; Lippincott Williams & Wilkins, New York, 2002.
4. Cooper and Gunn's Tutorial Pharmacy, ed. Carter S. J.: CBS Publishers, Delhi, 2000.
5. Bentley's textbook of Pharmaceutics: E. A. Rawlins

Reference Books:

1. Remington - The Science and Practice of Pharmacy: Gennaro, Alfonso R.; Lippincott Williams & Wilkins, New York, 2002.
2. Physicochemical Principles of Pharmacy: Florence A. T., Atwood D.; Macmillan Press Ltd., London 1998.

Additional Resources:

- Soft copies of physical pharmaceutics books are available on <http://www.pharmatext.org>
- Latest information available on <http://www.pharmainfo.net>