

**Department of Drug Chemistry**  
**Draft Syllabus of II Year Diploma Program (UG)**

**Title of Program: Medicinal Chemistry**  
**Syllabus Structure (UG)**

| Year | Semester  | Course No. | Course Code | Contact Hours | Credits<br>(1Credit=15 H) | Total Marks |            |
|------|---|------------|-------------|---------------|---------------------------|-------------|------------|
| 2    | III   | CT III     | DDCT 303    | 30            | 2                         | 75          |            |
|      |   | CL III     | DDCL303     | 60            | 2                         | 75          |            |
|      | IV  | CT IV      | DDCT 404    | 30            | 2                         | 75          |            |
|      |   | CL IV      | DDCL 404    | 60            | 2                         | 75          |            |
|      | Annual  | CP II      | DDCP202     | 30            | 1                         | 50          |            |
|      | Industrial and or Incubation and or<br>Research and or Field Training |            |             |               | 30                        | 1           | -          |
|      | <b>Total</b>  |            |             |               | <b>240</b>                | <b>10</b>   | <b>350</b> |

D: Diploma, \*: Departmental Code (C: Chemistry, MI: Microbiology, CSE: Computer Science (Entire), etc)

C: Course, T: Theory, L: Lab (Practical), P: Project

Total No. of Courses: 6 (Theory: 02, Practical: 02, Project: 01)

Theory and Practical: Semester, Project: Annual

### Semester III

**CT-III: DDCT 303: Title: Physical Pharmacy – I** (Contact Hrs: 30 Credits: 2)

**Learning Objectives:**

Objectives: Upon the completion of the course student shall be able to

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

**Unit I: States of Matter and Physicochemical Properties of Matter** (18)

Sates of Matter, changes in the states of matter, latent heat,vapour pressure, sublimation, critical point eutectic mixture, gases aerosols inhalers relative humidity liquid complexes liquid crystals Glassy States solid crystalline amorphous polymorphism

**Physical chemical properties of drug :** refractive index optical rotation dielectric constant dipole moment dissociation constant determination and applications

**pH, Buffers and Isotonic Solutions :** Sorensen's pH scale, pH determination (electromeric and calorimetric), applications of buffers, buffer equation, buffer capacity, Buffers in pharmaceutical and biological systems, buffered Isotonic Solutions.

**Unit II: Solubility of Drugs -**

**(12)**

solubility expressions, mechanism of solute solvent interactions, ideal solubility parameters, solvation and Association, Quantitative approach to the factor influencing solubility of drugs, diffusion principles in biological systems , solubility of gas in liquids, solubility of liquids in liquid (Binary solution, ideal solution) Roul't's law, real solutions, partially miscible liquids, critical solution temperature and applications, distribution law its limitations and applications

**Learning Outcomes:**

After completion of the unit, Student will be able to

- 1.To determine solubility of drug
2. To determine buffer capacity
3. To determine the role of various physicochemical properties of drug molecules in the designing the dosage forms

**Reference Books:**

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Phramacy, by Gaurav Jain & Roop K. Khar

**CL-III: DCL303: Title: Practical Physical Pharmacy I (Contact Hrs: 60 Credits: 02)****Learning Objectives:**

Students will be able to-

1. To determine solubility of drug at room temperature
2. To determine dissociation constant of various samples
3. To determine partition coefficient of samples in given solvent system
4. Able to handle different equipments ( pH meter, Refractometer)

**List of Practical's (15)**

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by half neutralization /Henderson Hasselbalch equation
3. Determination of stability constant and donor accepted ratio of cupric glycine complex by pH titration method
4. Determination of stability constant and donor acceptor ratio of PABA- Caffeine Complex by solubility method
5. Determination of partition coefficient of benzoic acid in Benzene and water
6. Determination of partition coefficient of iodine in carbon tetrachloride and water
7. Preparation of acidic buffer and measurement of pH
8. Preparation of basic buffer and measurement of pH
9. Determination of buffer capacity of given buffer
10. Determination of refractive index of given liquids
11. Determination of % composition of NaCl in a solution using phenol water system by CST method
12. Determination of dissociation constant of Acetic Acid
13. To determine the pKa value of given weak acid by pH metric titration with strong base
14. Purification of organic substance Re crystallization method
15. To determine the critical solution temperature for phenol water system

**Learning Outcomes:**

After completion of the unit, Students will be able to

1. Understand role of Partition coefficients in designing drug dosage form
2. Prepare buffer solutions of various pH values
3. Prepare purified organic compounds by using recrystallization

**Reference Books:**

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Phramacy, by Gaurav Jain &Roop K. Khar

**Semester IV**

**CT-IV:DDCT 404: Title: Physical Pharmacy II (Contact Hrs: 30 Credits: 2)**

**Learning Objectives:**

Students will be able to

1. Understand classification of colloids and their general properties
2. find out particle size by different methods
3. Study solid deformation

**Unit I: Colloidal dispersion and Rheology (18)**

Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.

**Rheology:** Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

**Deformation of solids:** Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

**Unit II : Micromeretics: (12)**

Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle

shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

### Course outcomes

After completion of the unit, Student will be able to-

1. Determine particle size and shape
2. Understand kinematic, viscosity, effect of temperature, non Newtonian system, pseudoplastic, dilatants and thixotropy in the formulation of drug dosage.

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1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanya
10. Test book of Physical Pharmacy, by Gaurav Jain &Roop K.
11. Physical Pharmacy by Subramanyam

**CL-IV:DDCL -404: Title: Practical Physical Pharmacy II (Contact Hrs: 60 Credits: 02)**

### Learning Objectives:

Students will be able to-

1. Determine particle size and particle size distribution
2. Determine angle of repose and influence of lubricant on it.
3. Determine molecular weight of given polymer

### List of Practical's

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using microscopic method
3. Determination of bulk density true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using ostwalds viscometer (any two)
6. Determination of sedimentation volume with effect of different suspending agents
7. Determination of sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semi solid by using Brookfield viscometer (any two)
9. To determine the molecular weight of a high polymer using its solution with different concentrations  
(any two)
10. To determine average molecular weight of polymer (any two).

### **Learning Outcomes:**

After completion of the unit, Student will able to

1. Find out molecular weight of given polymer
2. Determine viscosity of semi solid by using viscometer.
3. Determine the sedimentation volume

### **Reference Books:**

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea & Febiger, Philadelphia.
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11. Physical Pharmacy by Subramanyam

**CP-II:DDCP 202:Project  
(Contact Hrs.60, Credits:2)**

**Industrial and or Incubation and or Research and or Field Training  
(Contact Hrs. 60, Credits: 2)**

**BOS Sub-Committee**

1. Dr. P. A. Bharad (Chairman)
2. Ms.A. S. Choudhari (Member)
3. Ms. T.J. Sabale (Member)

**Expert Committee**

1. Name of Academic Expert- Dr. Suhit Gilda
2. Name of Industrial Expert- Mr. Sagar Deshpande