

Subject code: **13PH0704**

Subject name: **Novel Drug Delivery Systems**

Scope: This subject is designed to impart basic knowledge in the area of novel drug delivery systems.

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

1. To understand various approaches for the development of novel drug delivery systems.
2. To understand the criteria for the selection of drugs and polymers for the development of novel drug delivery systems, their formulation and evaluation.

Teaching and assessment scheme:

| Teaching Scheme (Hours) | | | Credits | Theory/ Tutorial Marks | | | Practical Marks | | Total Marks |
|-------------------------|----------|-----------|---------|------------------------|--------|---------|-----------------|----------|-------------|
| Theory | Tutorial | Practical | | CSE | IA (I) | ESE (E) | TW | Viva (V) | |
| 3 | 1 | 0 | 4 | 10 | 15 | 75 | 0 | 0 | 100 |

Theory syllabus:

Teaching hours: 45 Hours

Unit-1

10 Hours

Controlled drug delivery systems: Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations. Polymers: Introduction, classification, properties, advantages and application of polymers in the formulation of controlled release drug delivery systems.

Unit-2

10 Hours

Microencapsulation: Definition, advantages and disadvantages, microspheres/ microcapsules, microparticles, methods of microencapsulation, applications. Mucosal Drug Delivery system: Introduction, Principles of bioadhesion/ mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems. Implantable Drug Delivery Systems: Introduction, advantages and disadvantages, the concept of implants and osmotic pump.

Unit-3

10 Hours

Transdermal Drug Delivery Systems: Introduction, Permeation through the skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches. Gastro retentive drug delivery systems: Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high-density systems, inflatable and gastroadhesive systems and their applications. Nasopulmonary drug delivery system: Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers.

Unit-4

8 Hours

Targeted drug Delivery: Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications.

Unit-5

7 Hours

Ocular Drug Delivery Systems: Introduction, intraocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts
Intrauterine Drug Delivery Systems: Introduction, advantages and disadvantages, development of intrauterine devices (IUDs) and applications.

Tutorials will be based on the above syllabus.

Teaching hours: 15 Hours

Recommended References (Latest edition):

1. Y. W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopaedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Khar, Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

Journals

1. Indian Journal of Pharmaceutical Sciences (IPA)
2. Indian Drugs (IDMA)
3. Journal of Controlled Release (Elsevier Sciences)
4. Drug Development and Industrial Pharmacy (Marcel & Decker)
5. International Journal of Pharmaceutics (Elsevier Sciences)