



<b>Program</b>	Master of Pharmacy (M.Pharm)	<b>Semester - 1</b>
<b>Type of Course</b>	-	
<b>Prerequisite</b>		
<b>Course Objective</b>	-	
<b>Effective From A.Y.</b>	2023-24	

Teaching Scheme (Contact Hours)				Examination Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				External Marks (T)	Internal Marks (T)	External Marks (P)	Internal Marks (P)	
4	-	-	4	75	25	-	-	100

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	<b>Sustained Release (SR) and Controlled Release (CR) formulations</b> Introduction & basic concepts, advantages/ disadvantages, factors influencing, Physicochemical & biological approaches for SR/CR formulation, Mechanism of Drug Delivery from SR/CR formulation. Polymers: introduction, definition, classification, properties and application Dosage Forms for Personalized Medicine: Introduction, Definition, Pharmacogenetics, Categories of Patients for Personalized Medicines: Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, Telepharmacy.	10	17
2	<b>Rate Controlled Drug Delivery Systems</b> Principles & Fundamentals, Types, Activation; Modulated Drug Delivery Systems; Mechanically activated, pH activated, Enzyme activated, and Osmotic activated Drug Delivery Systems Feedback regulated Drug Delivery Systems; Principles & Fundamentals	10	17
3	<b>Gastro-Retentive Drug Delivery Systems</b> Principle, concepts advantages and disadvantages, Modulation of GI transit time approaches to extend GI transit. Buccal Drug Delivery Systems: Principle of mucoadhesion, advantages and disadvantages, Mechanism of drug permeation, Methods of formulation and its evaluations.	10	17
4	<b>Ocular Drug Delivery Systems</b> Barriers of drug permeation, Methods to overcome barriers.	6	10
5	<b>Transdermal Drug Delivery Systems</b> Structure of skin and barriers, Penetration enhancers, Transdermal Drug Delivery Systems, Formulation and evaluation.	10	17
6	<b>Protein and Peptide Delivery</b> Barriers for protein delivery. Formulation and Evaluation of delivery systems of proteins and other macromolecules	7	11
7	<b>Vaccine delivery systems</b> Vaccines, uptake of antigens, single shot vaccines, mucosal and transdermal delivery of vaccines.	7	11
<b>Total</b>		<b>60</b>	<b>100</b>

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyze	Evaluate
<b>Weightage</b>	80	15	5	0	0

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:**

C01	To know and understand the concept of sustained, controlled and customized drug delivery
C02	To know and understand the concept of various novel drug delivery systems

**Reference Books**

1.	<b>CONTROLLED &amp; NOVEL DRUG DELIVERY (TextBook)</b> By N.K. JAIN   CBS PUBLISHERS, Pub. Year 1997
2.	<b>NOVEL DRUG DELIVERY SYSTEM (TextBook)</b> By D.T BAVISKAR, D.K. JAIN   CBS PUBLISHERS, Pub. Year 2012
3.	<b>BIOPHARMACEUTICS &amp; PHARMACOKINETICS: A TREATISE (TextBook)</b> By D.M. BRAHMANKAR, S.B. JAISWAL   VALLABH PRAKASHAN, Pub. Year 2009
4.	<b>PROGRESS IN CONTROLLED &amp; NOVEL DRUG DELIVERY SYSTEM (TextBook)</b> By N.K. JAIN   CBS PUBLISHERS, Pub. Year 2001
5.	<b>PERSONALIZED MEDICINE: MOTIVATION, CHALLENGES, PROGRESS</b> By LAURA H, GOETZ MD, NICHOLAS J   FERTILITY & STERILITY JOURNAL, Pub. Year 2018
6.	<b>TELEPHARMACY: A PHARMACISTS PERSPECTIVE ON THE CLINICAL BENEFITS &amp; CHALLENGES</b> By NISSEN LM, POWEL A   INTEGRATED PHARMACY-RESEARCH & PRACTICE, Pub. Year 2016
7.	<b>NOVEL DRUG DELIVERY SYSTEM</b> By Y.W. CHEIN   MARCEL & DEKKER, Pub. Year 2005
8.	<b>ISRN PHARMACEUTICS ARTICLE 528079</b> By KERALIYA RAJESH, Pub. Year 2012
9.	<b>Encyclopedia of controlled delivery</b> By Edith Mathiowitz   Wiley Interscience Publication, John Wiley and Sons, Inc, New York! Chichester/Weinheim
10.	<b>Controlled Drug Delivery Systems</b> By Robinson, J. R., Lee V. H. L   Marcel Dekker, Inc., New York, Pub. Year 1992