CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Scheme of Teaching and Examination

Master of Pharmacy (M. Pharm)

(Pharmaceutics)

II Semester

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/ 2
							Theory / Practical				
				L	T	P	ESE	CT	TA		
1	Pharmacy	565211(41)	Pharmaceutics – I	4	1	-	100	20	20	140	
2	Pharmacy	565212(41)	Pharmaceutics – II	4	1	-	100	20	20	140	
3	Pharmacy	565213(41)	Pharmaceutics – III	4	1	-	100	20	20	140	
4	Pharmacy	565214(41)	Pharmaceutics – IV	4	1	-	100	20	20	140	
5	Pharmacy	565221(41)	Pharmaceutics – I Lab	-	-	6	100	-	50	150	
6	Pharmacy	565222(41)	Pharmaceutics – II Lab	-	-	6	100	-	50	150	
7	Pharmacy	565223(41)	Pharmaceutics – III Lab	-	-	6	100	-	40	140	
Total				**16**	**4**	**18**	**700**	**80**	**220**	**1000**	

L – Lecture, T – Tutorial, P - Practical,

Duration of Theory Paper 3 Hours

ESE – End Semester Examination, CT – Class Test, TA – Teacher Assessment

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Pharm. 2nd Semester** Branch: **Pharmacy**
Subject: **Pharmaceutics – I** Code: 565211(41)
Total Theory period: **50** Total Tutorial period: **12**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Unit -1:
Recent advances in tablet technology. Parenteral and Microencapsulation. Process automation in pharmaceutical manufacturing, role of GMP, Quality assurance and validation.

Unit -2:
Formulation and development of vitamins and antibiotic products.

Unit -3:
Disperse system, Molecular dispersion, solubilization theory methods of solubility enhancement, factor enfluencing solubility.

Unit - 4:
Coarse dispersion – Physical stability of suspension and emulsion, role of Zeta potential in stability of coarse dispersion, theory of emulsification, micro and multiple emulsion, rheology of suspension and emulsion, rheology of suspensions and emulsions. Drug kinetics in coarse disperse systems, drug diffusion in coarse disperse systems.

Unit -5:
Stability indicating assays, Advances in pharmaceutical packaging, Advances in polimer sciences and application in pharmacy.

Unit -6:
Collection ans classification of experimental data and its statistical treatment, Probability definition and laws of probability, Regression and correction, method of least squares, correlation coefficient and multiple regression, test of significance and t-test, Statistical quality control process control, control chart, acceptance sampling plans.

Book recommended:

1. Controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical analysis, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Pharm. 2nd Semester** Branch: **Pharmacy**
Subject: **Pharmaceutics – II** Code: 565212(41)
Total Theory period: **50** Total Tutorial period: **12**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Unit -1:
Fundamentals of controlled release drug delivery influence of drug properties and routes of drug administration on the design of sustained and controlled release systems.

Unit -2:
Pharmacokinetic / Pharmacodynamic basis of drug delivery, Dosing considerations and bioavailability assessment, Regulatory assessment.

Unit -3:
Design and fabrication of Oral controlled release drug delivery systems.

Unit - 4:
Parenteral products and Ocular drug delivery systems.

Unit -5:
Implantable products, Transdermal therapeutic system.

Unit -6:
Prodrugs as sustained chemical delivery system, Biochemical and Molecular approach to Controlled Drug delivery.

Book recommended:

1. Controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical analysis, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.
6. Controlled and novel drug delivery system, N. K. Jain.
7. Microencapsulation, J. R. Nixon.
8. J. R. Robinson.
9. Controlled and drug delivery, fundamental and application IInd edition N. K. Jain, V. H. L. C. Lee.
10. Novel Drug delivery system, N. J. Khandre, G. Madhvi

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Pharm. 2nd Semester** Branch: **Pharmacy**
Subject: **Pharmaceutics – III** Code: 565213(41)
Total Theory period: **50** Total Tutorial period: **12**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Unit -1:
Transport of drugs through membranes and barriers other than GI Tract, Buccal absorption, Salivary excretion of drugs, excreting of drugs via sweat, excretion of drugs in to milk, penetration of drugs into eye, transfer across placenta, passage of drugs into and out of cerebrospinal and brain.

Unit -2:
Measurement and Interpretation of in-vivo rates of dissolution, intrinsic rates of dissolution, dissolution of drugs from solid dosage forms, various modern methods and models for testing dissolution rate, factor and kinetics of dissolution.

Unit -3:
Bioavailability and bioequivalence, Bioequivalence and its determination, study design for the assessment of bioavailability and bioequivalence, factors influencing bioavailability and bioequivalence, Correlation of in- vitro Dissolution and in- vivo bioavailability, Statistical concept in estimation of bioavailability and bioequivalence.

Unit - 4:
Consideration of one, two and multiple compartment model on Intravenous administration, Intravenous infusion and first order absorption of single dose, Kinetics of reversible pharmacological effects – Direct and Indirect.

Unit - 5:
Clinical pharmacokinetics concept, absorption, Distribution and read clearance and elimination disposition and absorption kinetics, intravenous dose contain infusion, extra vascular dose, metabolite kinetics.

Unit - 6:
Physiological pharmacokinetic model, Concept, physiologic pharmacokinetic model with binding block flow – Limited versus diffusion limited model, application and limitation of physiologic pharmacokinetic models, mean residence time (MRT) Statistical moment theory, mean absorption time (MAT), mean residence time (MRT), Statistical moments theory, mean absorption time (MAT), Mean dissolution time (MDT).

Unit -7:
Non-linear Pharmacokinetics, Recognition of non-linearity, one two compartment open model with Michalis Menton Kinetic, Determination of Km and Vm, non-linear tissue binding constants.

Book recommended:

1. Applied Biopharmaceutics and pharmacokinetics. Mc-Graw Hill. Leon Shargel.
2. Biopharmaceutics and pharmacokinetics : A treatise. Vallabh prakashan. D.M. Brahmankar.
3. Biopharmaceutics and clinical pharmacokinetics. Marcel dekker Inc. New York. R.E. Notari.
4. Biopharmaceutics. Himalaya Publishing House Pvt. Ltd. India. S.N. Jogdand.
5. Biopharmaceutics and pharmacokinetics. Himalaya Publishing House Pvt. Ltd. India. G.R. Chatwal.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Pharm. 2nd Semester** Branch: **Pharmacy**
Subject: **Pharmaceutics – IV** Code: 565214(41)
Total Theory period: **50** Total Tutorial period: **12**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Unit - 1:

Package protection and its functions, Materials and pack selection - Factors, mechanical and physiochemical properties, Influence of Packaging components on dosage from stability and drug plastic consideration,

Unit - 2:

Various materials for containers and closures, classification, types, additives, processing, allowance and norms, Closures, Safety closures, tampers – Evident packing.

Unit - 3:

Drug package insert, Compliance, packaging, labeling for various pharmaceutical products.

Unit - 4:

Packaging of tablets, capsules, powder, ointments, Parenteral, ophthalmic.

Unit – 5:

Standardization of packaging material, bar code, colour codes, evaluation of package, standard for packaging, quality assurance systems, quality control consideration, regulatory requirements.

Unit – 6:

Trends in security packaging for monitoring effective storage condition for drug, Equipment for auto packaging, Environmental consideration in disposal.

Book recommended:

1. Controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical Sciences, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.
6. Controlled and novel drug delivery system, N. K. Jain.
7. Microencapsulation, J. R. Nixon.
8. J. R. Robinson.
9. Controlled and drug delivery, fundamental and application IInd edition N. K. Jain, V. H. L. C. Lee.
10. Novel Drug delivery system, N. J. Khandre, G. Madhvi

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Pharm. 2nd Semester**
Subject: **Pharmaceutics – I Lab**
Total Theory period: **72**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Branch: **Pharmacy**
Code: 565221(41)
Total Tutorial period: **12**

List of Experiments

1. Preparation and evaluation of solid dispersion of aspirin/ other drug by fusion method.
2. Preparation and evaluation of solid dispersion of aspirin/other drug by solvent evaporation method.
3. Preparation and evaluation of multiple emulsion.
4. Microencapsulation of aspirin/other drug by emulsion solvent evaporation method.
5. Preparation and evaluation of antacid suspension.
6. Preparation of liquid paraffin emulsion I.P. and determination of effect of homogenization time on globule size distribution.
7. Preparation and evaluation of floating tablets of aspirin.
8. Preparation and evaluation of hydrodynamically balanced system (HBS) tablet of Riboflavin.
9. Preparation and evaluation of microemulsion.
10. Preparation and evaluation of buccal tablets and study on the effect of binding agents on disintegration.

Book Recommended :

1. Controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical analysis, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,

BHILAI (C.G.)

Semester **: M-Pharm. 2nd Semester**
Subject : **Pharmaceutics – II Lab**
Total Practical period: **72**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Branch : **Pharmacy**
Code : 565222(41)
Total Tutorial period : **12**

List of Experiments

1. Preparation and evaluation of ophthalmic preparation.
2. Preparation of ethyl cellulose film as a rate controlling membrane for Paracetamol Transdermal patch.
3. Preparation of matrix embedded system of drug in hydrophobic polymer and its release rate.
4. Comparative study of *in-vitro* release of a drug of sustained release tablets by using HPMC and EC.
5. Preparation and evaluation of 0.3 % gentamycin eye solution.
6. Preparation and evaluation of colon delivery tablets of aspirin.
7. Preparation and evaluation of microcapsules of Isoniazide and Diclofenac sodium.
8. Preparation and evaluation of microspheres of Paracetamol by emulsification method.
9. Preparation and evaluation of liposomes of diclofenac sodium.
10. Preparation and evaluation of niosomes of Isoniazide by hand shaking method.
11. Preparation and evaluation of osmotic pump.
12. Preparation and evaluation of microspheres of ascorbic acid by solvent evaporation method.
13. To study the effect of two different polymers on release pattern of sustained release tablets of Paracetamol in basic buffer.

Book Recommended :

1. Controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical analysis, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.
6. Controlled and novel drug delivery system, N. K. Jain.
7. Microencapsulation, J. R. Nixon.
8. J. R. Robinson.
9. Controlled and drug delivery, fundamental and application IInd edition N. K. Jain, V. H. L. C. Lee.
10. Novel Drug delivery system, N. J. Khandre, G. Madhvi.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,

BHILAI (C.G.)

Semester : **M-Pharm. 2nd Semester**
Subject : **Pharmaceutics – III Lab**
Total Practical period: **72**
Total marks in the end Semester: **100**
Minimum of class test to be conducted: **2**

Branch : **Pharmacy**
Code : 565223(41)
Total Tutorial period: **12**

List of Experiments

1. Determination of partition coefficient and effect of pH on partition coefficient.
2. Study on protein binding.
3. Dissolution studies on marketed enteric coated tablets.
4. Evaluation of pharmacodynamics of antihypertensive drugs.
5. *In-vitro* dissolution studies on marketed erythromycin tablets.
6. *In-vitro* dissolution test of marketed sustained release capsules.
7. Comparative study on dissolution rate of Paracetamol tablet by different dissolution apparatus.
8. Determination of various pharmacokinetic parameters of a given drug after single dose oral administration by using urinary excretion method.
9. Study on the effect of various dietary factors on the bioavailability of given drug, administered orally, using urinary excretion data.

Book recommended:

1. controlled Drug Delivery System, J.R. Robinson and V.H.S.L. Lee.
2. Physical Pharmacy, 4th edition, A. Martin, J.C. Swarbrick.
3. Pharmaceutical Sciences, 'Ramington' A. R. Gennaro.
4. The theory and practice of Industrial pharmacy, IIIrd edition, L. Lachman, H. A. Liberman.
5. Modern Pharmaceutics, IInd edition, G. S. Banker, C.T. Rhodes.
6. Controlled and novel drug delivery system, N. K. Jain.
7. Microencapsulation, J. R. Nixon.
8. J. R. Robinson.
9. Controlled and drug delivery, fundamental and application IInd edition N. K. Jain, V. H. L. C. Lee.
10. Novel Drug delivery system, N. J. Khandre, G. Madhvi