Bachelor of Pharmacy 4th year (VII Semester)
(Theory and Practical)

S No.	Course	Subject name	Credits		Sessional			Exam	Total
			T	P	TA	MSE	Total	ESE	
1	GSP-701	Pharmaceutical Analysis- III	3	0	30	20	50	50	100
2	GSP-702	Biopharmaceutics and Pharmacokinetics	3	0	30	20	50	50	100
3	GSP-703	Medicinal Chemistry-III	4	0	30	20	50	50	100
4	GSP-704	Pharmacology- III	3	0	30	20	50	50	100
5	GSP-705	Chemistry of Natural Products	3	0	30	20	50	50	100
PRACTICAL									
6	GSP-701P	Pharmaceutical Analysis-III	0	2	30	20	50	50	100
7	GSP-702P	Biopharmaceutics and Pharmacokinetics	0	2	30	20	50	50	100
8	GSP-704P	Pharmacology- III	0	2	30	20	50	50	100
9	GSP-705P	Chemistry of Natural Products	0	2	30	20	50	50	100
Total									**900**

T- Theory, P- Practical, TA- Teacher Assessment, MSE- Mid Semester Examination, ESE- End semester examination.

GSP-701
PHARMACEUTICAL ANALYSIS -III

UNIT-1.
[08]
UV & Visible spectrophotometry Method- Theory, Instrumentation and applications, Ultra violet and Visible- Electronic excitation, spectrophotometry, quantitative laws, derivation for Beer's and Lambert law & its deviation, single and double beam spectrophotometry instrumentation. Applications in pharmacopoeial analysis.

UNIT-2.
[08]
Fluorimetric Analysis- Theory, Instrumentation and applications. Infra- Red spectrophotometry, Interpretation of IR, spectra of simple compounds, FTIR, applications in pharmaceutical analysis.

UNIT-3.
[10]
NMR Spectroscopy- Theory of ^{1}H NMR, chemical shift, Shielding & Desheilding, spin-spin coupling, spin-spin splitting spectra of simple compounds. Applications in pharmacopoeial analysis.

UNIT-4.
[08]
Mass Spectroscopy- Theory, Instrumentation & Applications, mass spectra of some simple compounds. Applications in pharmacopoeial analysis.

UNIT-5.
[06]
Basic Principles, Instrumentation and Application of GLC & HPLC. Applications in pharmacopoeial analysis.

GSP-701P
PHARMACEUTICAL ANALYSIS –III (PRACTICAL)

1. Assay of official formulation containing more than one ingredients using instrumental techniques.
2. Interpretation of spectra.

BOOKS RECOMMENDED:

1. Willard H.H. and Merrit L. Jr and Dean J.A., Instrumental methods of analysis Van Nostrand Renhold, New York.
2. Skoog V, Principles of Instrumental Analysis, Holler-Neimen
3. Kemp William, organic spectroscopy, PALGRAVE NewYork
4. Silver stein RM & Webster FX, Spectrometric Identification of Organic Compounds, John Wiley & Sons.
5. Chatten L.G. A text book of Pharmaceutical Chemistry Vol. I & II Marcel, Dekker, New York.

6. Becket A.H. and Stenlake J.B. Practical Pharmaceutical Chemistry Vol. I and II, The Athlone Press of the University of London.
7. Pharmacopoeia of India, Ministry of Health, Govt of India.

GSP-702
BIOPHARMACEUTICS & PHARMACOKINETICS

UNIT-1.

Introduction to Biopharmaceutics and Pharmacokinetics, Biopharmaceuitcal Classification System Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis). Factors influencing absorption. Distribution, metabolism and excretion.

UNIT-2.

Pharmacokinetics: Significance of plasma drug concentration measurement. Compartment model and Non-compartment model. Pharmacokinetics of drug absorption – zero order and first order absorption rate constant using Wagner – Nelson, Loo-Reigelman method.

UNIT-3.

Volume of distribution and distribution coefficient. Compartment kinetics – One compartment and Preliminary information of multicompartment models. Determination of pharmacokinetic parameters from plasma and urine data after drug administration by intravascular and oral route. Clinical Pharmacokinetics: Definition and scope.

UNIT-4.

Dosage adjustment in patients with and without renal and hepatic failure. Pharmacokinetic drug interactions and their significance in combination therapy.

UNIT-5.

Bioavailability and Bioequivalence:

Measures of bioavailability, C-max, and area under the curve (AUC). Review of regulatory requirements for conduction of bioequivalent studies.

GSP-702P
BIOPHARMACEUTICS & PHARMACOKINETICS (PRACTICAL)

1. Experiments designed for the estimation of various pharmacokinetic parameters with given data.
2. In *vitro* evaluation of different dosage forms for drug release.
3. Absorption studies – in vitro.
4. Bioavailability and Bioequivalence studies
5. Permeability studies
6. Protein binding
7. Statistical treatment of pharmaceutical data.

BOOKS RECOMMENDED:

1. Notari, R.E, Biopharmaceutics and Pharmacokinetics – An introduction Marcel Dekker Inc. N.Y.

2. Rowland M, and Tozer T.N. Clinical Pharmacokinetics, Lea and Febriger, N.Y.
3. Wagner J.G. Fundamentals of Clinical Pharmacokinetics, Drugs Intelligence Publishers, Hamilton.
4. Gibaldi, Milo' Biopharmaceutics & Clinical pharmacokinetics.
5. John. G.Wagner," Pharmacokinetics for the Pharmaceutical Scientist'.

GSP –703
MEDICINAL CHEMISTRY - III

UNIT-1.

Introduction, Classification, Mode of action, uses, structure-activity relationship of the following classes of drug (Synthetic procedures of individually mentioned drugs only).

Steroids and related drugs: Special emphasis on Nomenclature, Stereochemistry

Androgens and Anabolic steroids: Testosterone,

Estrogens and Progestogens: Progesterone, Estradiol.

Adrenocorticoids: Dexamethasone.

UNIT-2.

Introduction, Classification, Mode of action, structure-activity relationship, uses and synthesis of the specified of drugs only.

Chloramphenicol, Clavulanic acid.

Antimycobacterial Agents: PAS, Ethambutol, Isoniazid, Dapsone.

UNIT-3.

Introduction, Classification, Mode of action, structure-activity relationship and uses of the following classes of drug (Synthetic procedures of individually mentioned drugs only).

Antimalarials: Cholroquine, Primaquine.

Antiamoebics: Metronidazole, Tinidazole, Diloxanide.

Anthelmintics: Mebendazole

Antifungals: Griseofulvin, Clotrimazole Amphotericin B.

UNIT-4.

Introduction, Classification, Mode of action, structure-activity relationship and uses of the following classes of drug (Synthetic procedures of individually mentioned drugs only).

Prostaglandins: Misoprostol, Carboprost.

Skeletal muscle relaxants: Chlorphenesin, Methocarbamol, Chlorzoxazone

Drugs used in spasticity: Baclofen, Buspirone

UNIT 5.

Introduction, Classification, Mode of action, structure-activity relationship and uses of the following classes of drug (Synthetic procedures of individually mentioned drugs only).

Thyroid and Antithyroids: Carbimazole, Levothyroxine, Propylthiouracil, Methimazole.

Anti-Fertility: Drugs.

GSP-703P
MEDICINAL CHEMISTRY (PRACTICALS)

1. Synthesis of at least five selected drugs from the course content involving two or more steps.
2. Establishing the pharmacopoeial standards of the drugs synthesized.

BOOKS RECOMMENDED:

1. Delagado J N and Remers W A R, Eds., Wilson And Giswold's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
2. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.

3. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
4. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
5. Patrick G L. Medicinal Chemistry, Oxford University Press NY
6. Vardanayan R. Synthesis of Essential Drugs, Acacdemic press an imprint of Elsevier
7. Indian Pharmacopoeia
8. IL Finar TB of organic chemistry
9. AI Vogel TB of Practical organic chemistry
10. The Organic chemistry of drug synthesis Lednicer Mitzsher
11. Mann and Saunders Practical organic chemistry

GSP– 704
PHARMACOLOGY-III

UNIT-1.

Pharmacology of Endocrine System- Hypothalamic & pituitary hormones, Thyroid hormones & Thyroid Drugs, Parathormone, Calcitonin & Vitamin D, Insulin, oral hypoglycemic agents & glucagon.

UNIT-2.

ACTH & Corticosteroids, Androgens & anabolic steroids, Estrogens, Progesterone & Oral Contraceptives, Drugs acting on uterus.

UNIT-3.

Drugs acting on GIT- Antacids and Antiulcer drugs, Laxatives and antidiarrhoeal Agents, Emetics and antiemetics.

UNIT 4.

Drugs acting on skin and mucous membranes, antiseptics, disinfectants, vaccines and Sera, Vitamins.

UNIT-5.

Principles of Toxicology- Definition of poison, general principles of treatment of poisoning with particular reference to barbiturates, opioids, organophosphorous & atropine poisoning, Heavy metal Anatagonists.

GSP-704P
PHARMACOLOGY- III (PRACTICAL)

Relevant practicals based on theory syllabus

BOOKS RECOMMENDED:

1. Goodman & Gilman, The Pharmacological basis of Therapeutics, Pergamon Press. Editors:- J.G. Hardman, Le Limbird, PB Molinoss, RW Ruddon & AG Gil, Pergamon Press.
2. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International.
3. Laurene, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone.
4. Rang MP, Dale MM, Riter JM, Pharmacology Churchill Livingstone.
5. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
6. Barar F.S.K : Text Book of Pharmacology, Interprint, New Delhi.
7. Satoskar & Bhandarkar: Pharmacology & Pharmacotheropeutics, Popular Prakashan Pvt. Ltd., Bombay.
8. Paul. L., Principles of Pharmacology, Chapman and Hall.
9. Ghosh M.N. Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta.
10. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi.
11. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi.

GSP-705
CHEMISTRY OF NATURAL PRODUCTS

Different techniques of extraction and isolation of natural compounds. Introduction, classification and chemistry of the mentioned compounds.

UNIT-1.

Glycosides: Salicin, amygdalin, digitalis & stropanthus (Structural features)

Alkaloids: Atropine, Nicotine, Quinine. Structural features of morphine & reserpine.

UNIT-2.

Steriods: Structural elucidation of cholesterol & Vit. D, Structural features of corticoids, sex harmones, ergosterol, and saponin.

UNIT-3.

Lipids and fatty acids: Physiochemical properties and significance of lipids and fats, Determination of acid, saponification, ester and iodine value and their significance.

UNIT-4.

Terpenoids : Citral, menthol and camphor.

UNIT-5.

Amino acids, proteins: Preparation, properties and end group analysis. Protein structure (Primary, Secondary, tertiary and quaternary polypeptides).

GSP-705 P
CHEMISTRY OF NATURAL PRODUCTS (PRACTICAL)

1. Isolation of natural organic compounds from medicinal plants (Isolation of caffeine from Tea leaves,
2. Isolation of piperine from Black Pepper, Isolation of Hesperidin from Orange Peel, Isolation of Clove oil from clove, Isolation of Caraway oil from caraway, Isolation of cumin oil from cumin.)
3. Extraction of essential oils
4. Analysis of fixed oils (acid value, saponification value, ester value, and iodine value)
5. Identification test of cholesterol.

BOOKS RECOMMENDED:

1. Manitto, Biosynthesis of Natural Products, Wiley India
2. Praveen Kumar, Natural Products a Practical Manual, Pharma Med Press
3. Finar I.L, Organic chemistry, Vol. II,., Pearson Education Pvt Ltd, New Delhi,2002.
4. Agarwal O.P., Chemistry of Natural Products, Vol. I & II, 7th ed., Goel Publishing House, Meerut, 1983.
5. Indian Pharmacopoeia (Latest Edition)
6. Morrison, R.T., and Boyd R.N., Organic Chemistry, Prentice Hall of India Pvt. Ltd, New Delhi.