

UTTARAKHAND TECHNICAL UNIVERSITY DEHRADUN
STUDY AND EVALUATION SCHEME
[New Syllabus]

Course: B.Pharm.

Year – III, Semester – V

S.N.	Course Code	Subject Name	Period (Hours)		Sessional			Exam	Subject Total	Credits
			L	P	CT	TA	Total	ESE		
1	PHR- 501	Pharmaceutical Chemistry	3	0	15	05	20	80	100	3
2	PHR- 502	Pharmaceutical Technology-I	3	0	15	05	20	80	100	3
3	PHR- 503	Medicinal Chemistry-I	3	0	15	05	20	80	100	3
4	PHR- 504	Pharmacology-I	3	0	15	05	20	80	100	3
5	PHR- 505	Pharmaceutical Microbiology	3	0	15	05	20	80	100	3
Practical Day to Day Evaluation										
6	PHR- 501P	Pharmaceutical Chemistry	0	4	--	--	20	80	100	2
7	PHR- 502P	Pharmaceutical Technology-I	0	4	--	--	20	80	100	2
8	PHR- 503P	Medicinal Chemistry-I	0	4	--	--	20	80	100	2
9	PHR- 504P	Pharmacology-I	0	4	--	--	20	80	100	2
10	PHR- 505P	Pharmaceutical Microbiology	0	4	--	--	20	80	100	2
			15	20	--	--	200	800	1000	

T.A. – Teacher Assessment, ESE – End Semester Examination, CT – Cumulative Test

Note: - Duration in Theory & Practical of ESE shall be 3 (three) hours and 4 (four) hours respectively

0.6 Credits – Sessional
2.4 Credits - ESE

UTTARAKHAND TECHNICAL UNIVERSITY DEHRADUN
STUDY AND EVALUATION SCHEME
[New Syllabus]

Course: B. Pharm.

S.N.	Course Code	Subject Name	Period (Hours)		Sessional			Exam	Subject Total	Credits
			L	P	CT	TA	Total	ESE		
1	PHR- 601	Pharmaceutical Biotechnology	3	0	15	05	20	80	100	3
2	PHR- 602	Pharmaceutical Technology-II	3	0	15	05	20	80	100	3
3	PHR- 603	Medicinal Chemistry-II	3	0	15	05	20	80	100	3
4	PHR- 604	Pharmacology-II	3	0	15	05	20	80	100	3
5	PHR- 605	Pharmacognosy-II	3	0	15	05	20	80	100	3
Practical Day to Day Evaluation										
6	PHR- 602P	Pharmaceutical Technology-II	0	4	--	--	20	80	100	2
7	PHR- 603P	Medicinal Chemistry-II	0	4	--	--	20	80	100	2
8	PHR- 604P	Pharmacology-II	0	4	--	--	20	80	100	2
9	PHR- 605P	Pharmacognosy-II	0	4	--	--	20	80	100	2
	PHR- 606P	PC-II	0	4	--	--	20	80	100	3
			15	20	--	--	200	800	1000	2

Year – III Semester - VI

T.A. – Teacher Assessment, ESE – End Semester Examination, CT – Cumulative Test

Note: - Duration in Theory & Practical of ESE shall be 3 (three) hours and 4 (four) hours respectively

0.6 Credits – Sessional

2.4 Credits - ESE

B.Pharm III (V Semester)

PHR-501

PHARMACEUTICAL CHEMISTRY-V (BIOCHEMISTRY)

Unit-I:

- a. Enzymes:** Nomenclature, enzymes-kinetics and mechanism of action, mechanism of inhibition of enzymes and isoenzymes in chemical diagnosis.
- b. Co-enzymes:** Vitamins as co-enzymes and their significance. Metals as co-enzymes and their significance. [08]

Unit-II

- a. Carbohydrate metabolism:** Glycolysis, Gluconeogenesis and Glycogenolysis. Metabolism of galactose. [08]

Unit-III

- a.** Role of sugar nucleotides in biosynthesis and pentose phosphate pathway.
- b.** The citric acid cycle, significance, reactions and energetics of the cycle. [08]

Unit-IV

- a. Lipid metabolism:** Oxidation of fatty acid & energetics, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids, regulation of lipid metabolism, essential fatty acids.
- b. Biological Oxidation:** The respiratory chain, its role in energy capture & control, energetics of oxidative phosphorylation, mechanism of oxidative phosphorylation. [08]

Unit-V

- a. Protein metabolism:** Biosynthesis of amino acids, metabolism of amino acids and conversion of amino acids to specialized products, biosynthesis of purine and pyrimidine, formation of deoxyribonucleotides.
- b.** Biosynthesis of RNA, DNA replication, Biochemical aspects of Carcinogenesis & DNA repair mechanism. [08]

PHARM- 501P

PHARMACEUTICAL CHEMISTRY-V (BIOCHEMISTRY) PRACTICAL

1. Preparation of standard buffers (citrate, phosphate and carbonate) and measurement of pH.
2. Titration curve for amino acids.
3. Separation of amino acids by chromatography.
4. Separation of lipids by TLC.
5. Quantitative estimation of amino acids.
6. Determination of glucose by means of the enzyme glucose oxidase.
7. Enzymatic hydrolysis of glycogen by α & β amylase.
8. Effects of temperature on the activity of alpha amylase.
9. Estimation of cholesterol in Blood.
10. Estimation of Glucose in blood & urine.
11. Estimation of Urea in blood.
12. Estimation of ketone bodies in blood.
13. Qualitative analysis of inorganic as well as organic constituents of Urine.

BOOKS RECOMMENDED:

1. "Harpers Review of Biochemistry" Lange Medical Publication.
2. Boyer, modern experimental biochemistry, Pearson education
3. Sharad chand bose, Biochemistry. a practical manual, PharmaMed Press, Hyderabad
4. Shrinivas, Text book of Biochemistry, PharmaMed Press, Hyderabad

- .5. Moore, Biochemistry and physiology of plants,
6. Jayaraman J., Laboratory Manual of Biochemistry, Wiley Eastern Limited.
- 7 Plummer, David J., An Introduction to Practical Biochemistry, Mc Graw Hill, New Delhi.
8. Singh S.P., Practical Manual to Biochemistry, CBS Publisher, New Delhi.

PHR-502

**PHARMACEUTICS
(PHARMACEUTICAL TECHNOLOGY -I)**

Unit-I: Preformulation studies:

Study of physical properties of drug like physical form, polymorphism, particle size, shape, density, wetting, dielectric constant, dissociation constant, distribution coefficient Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability. [08]

Unit-II: Liquid Dosage Forms: Introduction, types of permissible additives, formulation, manufacturing, evaluation and packaging of clear liquids, suspensions permissible and emulsions. [08]

Unit-III: Semisolid Dosage Forms: Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection, permissible additives, manufacturing procedure, evaluation and packaging and general formulation of semisolids, clear gels, permissible additives [08]

Unit-IV: Suppositories: Ideal requirements, bases, manufacturing procedure, evaluation and packaging [08]

Unit-V:

Pharmaceutical Aerosols: Definition, Propellants, general formulation and evaluation, manufacturing and packaging methods, pharmaceutical applications.

Cosmetology and cosmetic Preparations: Formulation of cold cream, vanishing cream, cleansing cream, all purpose cream, sunscreen lotion, antiperspirants, deodorant. Shampoos, Conditioner, Shaving and after shaving products, Dentifrice Lipstick, Nail lacquer. [08]

PHR-502P

**PHARMACEUTICS
(PHARMACEUTICAL TECHNOLOGY-I)
PRACTICAL**

1. Preformulation studies of API. (As per pharmacopoeial requirements)
2. Preparation, evaluation and packing of liquid orals like solutions, suspensions and emulsions, ointments, suppositories, eye drops, eye ointments etc.
3. Preparation and evaluation of cold cream, vanishing cream, cleansing lotion and creams. Moisturizing creams, Skin tonics, Hair creams, Hair Conditioners, Shampoos, Shaving creams and sticks. Tooth powder, Tooth pastes, After shave lotion, Lipsticks.

BOOKS RECOMMENDED

1. Remington's Pharmaceutical Sciences, Vol. I & Vol. – II, Mack Publishing Co., U.S.A.
2. Dinda, SC, Advances in pharmaceutical Technology, pharmaMed Press, Hyderabad.
3. Lachman L., Lieberman H.A, Kanig J.L, Theory and Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia, U.S.A.

4. H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lea & Febiger, Philadelphia, U.S.A.
5. Harrys Cosmetology
6. Balsam and Sagarin, Cosmetics: Science and Technology.
7. Thomssen E.G. Modern Cosmetics, Universal Publishing Corporation.
8. Mittal B.M. & Saha R.N.-A handbook of cosmetics, Vallabh Prakashan.
9. Swarnlata saraf, Cosmetics a practical manual, 2nd.ed, PharmaMed Press, Hyderabad
10. Drugs and Cosmetics Act and Rules
11. Poucher "Cosmetics".pharmamed press,hyderabad

PHR-503

**PHARMACEUTICAL CHEMISTRY-VI
(MEDICINAL CHEMISTRY –I)**

Unit-I: Basic Principles of Medicinal Chemistry: Physicochemical aspects (Optical, geometric and bioisosterism) of drug molecules and biological action. Drug-receptor interaction including transduction mechanism, concept of prodrug. [08]

Mode of action, uses, structure activity relationship of the following classes of drugs (Synthetic and assay procedures of individually mentioned drugs only) included in the latest edition of pharmacopoeia.

Unit-II: Drugs acting at Synaptic and neuro-effector junction sites:

Cholinergic, Anticholinergic & Anticholinesterases- Neostigmine, Physostigmine, Pilocarpine, Atropine. Adrenergic Drugs- Ephedrine, Salbutamol, Adrenaline.

[08]

Unit-III: Drugs acting on the Central Nervous System:

[08]

General Anaesthetics-Thiopental, Ketamine

Local Anaesthetics- Lignocaine, Benzocaine.

Sedatives and Hypnotics- Phenobarbitone, Alprazolam.

Opioid Analgesics-Pethidine, Methadone, Pentazocine.

Unit-IV:

[08]

Anticonvulsants-Phenytoin, Carbamazepine, Ethosuximide, Valproic Acid.

Antiparkinsonism drugs- Carbidopa, Levodopa.

CNS Stimulants-Caffeine, Nikethamide.

Unit-V: Psychopharmacological Agents:

[08]

Antianxiety drugs- Diazepam, chlordiazepoxide.

Antidepressants – Imipramine, Amitriptyline Fluoxetine.

Skeletal muscle Relaxants– Gallamine Mephenesin,

Antipsychotic- Chlorpromazine, Haloperidol.

PHR -503P

**PHARMACEUTICAL CHEMISTRY-VI
(MEDICINAL CHEMISTRY-I)**

PRACTICAL

1. Synthesis of atleast five drugs from the course content involving two or more steps. eg Benzocaine, Phenytoin, Barbituric acid, Nikethamide etc
2. Establishing the pharmacopoeial standards of the drugs synthesized.

BOOKS RECOMMENDED:

1. Degado J.N. and Remers W A R, 10th eds., Wilson and Giswold's Text book of Organic Medicinal and Pharmaceutical Chemistry, Lippincott, William & Wilkins.
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. Norgady, Medicinal chemistry, biochemical approach, PharmaMrd press, Hyd.
6. Rama rao nadendla, Medicinal chemistry, PharmaMed Press, Hyd,
7. Vardanayan R. Synthesis of Essential Drugs, Academic press an imprint of Elsevier
8. Wermuth C G. The practice of Medicinal Chemistry-III, Academic press an imprint of Elsevier
9. Pharmacopoeia of India, Ministry of Health, Govt. of India 2010
10. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/Longman, London.
11. Furniss B A, Hannaford A J, Smith P W G and Tatehell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.

PHR-504

PHARMACOLOGY – I

Unit-I: General Pharmacology – Introduction to pharmacology, routes of drug administration, combined effect of drugs, factors modifying drug action. [07]

Unit-II: Basic Concepts of Pharmacokinetics- Absorption, Distribution, Metabolism, Excretion Pharmacodynamics, Principles of drug action, Mechanism of drug action, Receptors, Dose Response curve, Therapeutics index -LD 50 & ED50,. [07]

Unit-III: Pharmacology of ANS

Drug acting on autonomic nervous system

I-Cholinergic system-

Parasympathomimetic (Cholinergic) drugs.

Parasympatholytic (anti Cholinergic) drugs.

Drug acting on autonomic ganglia (Stimulants and blocking agents)

II-Adrenergic system

Sympathomimetic (Adrenergic) drugs

Sympatholytic (Anti-adrenergic) drugs [08]

Unit-IV: Pharmacology of CNS

General Anaesthetics, Alcohols & disulfiram, Sedative hypnotics,

Psychopharmacological agents-anti anxiety agents, antipsychotics, antidepressants. Antiepileptic drugs, Antiparkinsonism drugs, Analgesics & antagonists. [12]

Unit-V: Drugs acting on PNS

Local anesthetics [06]

Skeletal muscle Relaxants Peripherally and centrally acting muscle Relaxants

PHR-504P

**PHARMACOLOGY- I
PRACTICAL**

Use of computer simulated CDs or Video cassettes for pharmacology practical where possible.

1. Preparation of different solutions for experiments. Drug dilutions, use of molar and w/v solutions in experimental pharmacology. Common laboratory animals and anesthetics used in animal studies. Commonly used instruments in experimental pharmacology. Some common and standard techniques.
2. Study of different routes of administration of drugs in mice/rats. Practical related to DRC

BOOKS RECOMMENDED:

1. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors: J.G. Hardman, McGraw Hill Pub Co.,
2. Friedman, Fundamentals of clinical trials, 3rd, ed., Springer Intl
3. Turley, Understanding pharmacology, 3^{ed}, ed, Pearson educations.
4. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
5. Bothara Sunil, Essentials of Experimental pharmacology, vol. 1. PharmaMed Press

6. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics., Popular Prakashan Pvt. Ltd. Bombay.
7. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta.
8. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi.
9. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi.
10. Turner, Screening Methods in pharmacology, Elsevier

PHR-505

PHARMACEUTICAL MICROBIOLOGY

Unit-I:

Introduction to the scope of microbiology and microscopy

Structure of bacterial cell.

Classification of microbes and their taxonomy: Bacteria, fungi and viruses. [08]

Unit-II:

Identification of Microbes: Stains and types of staining techniques.

Nutrition, cultivation, isolation and purification of bacteria, fungi & viruses.

Different culture media and their classification-

Microbial growth and their curve, measurement of microbial growth, factor influencing Microbial growth [08]

Unit-III:

Control of microbes by physical and chemical methods.

Disinfection, factors influencing disinfectants, dynamics of disinfection,

Disinfectants and antiseptics and their evaluation.

Preservative efficacy [08]

Unit-IV:

Sterilization, different methods, validation of sterilization methods & equipments.

Sterility testing as per I.P. Isolation and identification of contaminants in sterile and non-sterile

Products, Microbiological standards of non-sterile products, Equilibrium related to humidity (ERH) in microbiological testing. [08]

Unit-V:

Microbial assays as per I.P. of antibiotics and vitamins. [08]

PHR-505P

**PHARMACEUTICAL MICROBIOLOGY
PRACTICAL**

1. Various staining methods, 2. Experiments designed to prepare various types of culture media sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast, 3. Various methods of isolation and identification of microbes 4. Sterilization techniques and their validation, validation of sterilization techniques 5. Evaluation of antiseptics and disinfectants 6. Testing the sterility of pharmaceutical products as per I.P. requirements, 7. Microbial assay of antibiotics and vitamins, 8. preservative efficacy, 9. Microbiological testing of non-sterile products.

BOOKS RECOMMENDED:

1. Stanier R.Y., Ingraham, J.L., Wheelis M.L. & Painter P.R. General Microbiology, Macmillan Press Limited.
2. Malathi, Manual of Practical Microbiology, PharMAmED Press, Hyderabad
3. Tortora, Microbiology An Introduction, 9TH. Ed, Pearson education

4. Glazer, "Microbial Biotechnology" Cambridge Univ. Press
5. Pelczar & Reid, Microbiology, Tata Mc Graw Hill, Delhi.
6. Ananthanarayan R & Paniker CKJ, Textbook of Microbiology, Orient Longman.
7. Aneja K.R. Experiments in Microbiology, Plant Pathology, Tissue Culture & Mushroom Cultivation, Vishwa Prakashan.
8. Gunasekaran P, Lab Manual of Microbiology, New Age Publishers.
9. Latest edition of USP
10. Latest edition of IP
11. Latest edition of B.P.

B.Pharm III (VI Semester)

PHR –601

PHARMACEUTICAL BIOTECHNOLOGY

Unit-I: Immunology and Immunological preparations:

Principles, Antigen and haptens, immune system, Cellular, and humoral immunity, immunological tolerance, antigen-antibody reactions and their applications, standardization and storage of BCG. Complementary system, Immunological disorder, Hypersensitivity reaction, Immunosuppression, Autoimmune disorders, immunodeficiency disorders

[08]

Unit-II: Genetic Recombination

Genetic Code and inhibition of protein synthesis. Regulation of gene expression (Prokaryote and Eukaryote)

Transformation, conjugation, transduction, protoplast fusion and gene cloning and their applications, development of hybridoma for monoclonal antibodies, study of drugs produced by biotechnology such as Human Insulin, Somatotropin, Streptokinase, Urokinase. Isolation and uses of mutants and factors affecting mutation and genetic analysis of mutants

[08]

Unit-III:

Microbial Transformation:

Introduction, types of reactions mediated by microorganisms, Design of Bio-transformation process, selection of organisms, biotransformation processes and its improvements with special reference to steroids

[08]

Unit-IV:

Enzyme immobilization:

Techniques of immobilization of enzymes, factors affecting enzyme kinetics, multistep immobilized enzyme system. Application and future of enzyme engineering

[08]

Unit-V:

Antibiotics:

Historical development of antibiotics, Screening of soil for organisms producing antibiotics Antimicrobial spectrum and methods used for their standardization. Fermentor, its design and control of different parameters

[08]

BOOKS RECOMMENDED:

1. S.P. Vyas and V.K. Dixit, Pharmaceutical Biotechnology, CBS Publication, New Delhi.
2. Nagori, Foundations in pharmaceutical biotechnology, PharmaMed Press, Hyderabad
3. Thieeman, introduction to biotechnology, Pearson education.
4. P.F. Standury & A. Whitaker & Hall S.J. Principles of Fermentation, Aditya Book Private Limited, New Delhi.
5. Crueger W. & Crueger A, Biotechnology-A Textbook of Industrial Microbiology,
6. Smith J.E., Biotechnology, 3rd edition, Cambridge university press

7. IP (Latest edition)
8. BP (Latest edition)
9. USP (Latest edition)

PHR-602

**PHARMACEUTICS-VII
(PHARMACEUTICAL TECHNOLOGY - II)**

Unit-I: Tablets: (A) Formulation of different types of tablets, granulation technology on large-scale by various techniques, physics of tablets making, machinery and tooling and the equipments employed, evaluation of tablets including stability testing as per ICH guidelines

(B) Coating of Tablets: Types of coating, film forming materials, formulation of coating solution, equipments for coating process, evaluation of coated tablet. [09]

Unit-II: 1. Capsules: Introduction to capsules as a dosage form, hard and soft gelatin capsules, formulation and evaluation, machinery, packaging, stability testing and storage

2. Micro-encapsulation: Types of microcapsule, importance of micro-encapsulation in pharmacy, micro-encapsulation techniques, evaluation of micro capsules. [8]

Unit-III: (A) Approaches to Sustained and controlled release dosage forms. In-vitro methods of evaluation. [08]

Unit-IV: Parenteral Products:

Preformulation factors, routes of administration, water for injection, pyrogenicity, nonaqueous vehicles. Formulation and evaluation, equipments, containers and closures and their selection. [07]

Unit-V:

(A) Sterile products (ISI/ BS specification)

(B) Formulation and evaluation of Ophthalmic, Nasal and Ear products. [08]

PHR-602P

**PHARMACEUTICS-VII
(PHARMACEUTICAL TECHNOLOGY - II)**

PRACTICAL

1. Experiments to illustrate preparation, stabilization and evaluation of pharmaceutical products as per the theory syllabus
2. Evaluation of Materials used in pharmaceutical packaging (ISI/ BS specification)

BOOKS RECOMMENDED

1. Remington: The Science and Practice of Pharmacy Pharmaceutical Sciences Vol. I & II Lippincott William Wilkins
2. R.E. Avis, Pharmaceutical Dosage Forms: Parenteral Medication, Vol-I, Marcel Dekker-Inc, New York & Basel.
3. H.C. Ansel, Introduction to Pharmaceutical Dosage Forms, Lippincott William Wilkins
4. Herbert A. Liebermann & Leon Lachman, Theory & Practice of Industrial Pharmacy,
5. Manohar A.Potdar, 'CGMP for Pharmaceuticals'.PharmaMed Press,Hyderabad

6. Augsburger Larry L. "Pharmaceutical Dosage Forms: tablets" 3rd edition Informa healthcare
7. IP (Latest edition)
8. BP (Latest edition)
9. USP (Latest edition)
10. Tutorial Pharmacy by Cooper and Gunn, CBS Publisher do
11. Senger, A primer on dosage form design, PharmaMed Press, Hyd,

PHR –603

**PHARMACEUTICAL CHEMISTRY-VII
(MEDICINAL CHEMISTRY - II)**

Unit-I-Drug Design

Basic concept of drug design, Introduction to Analogues based drug design, Structure based drug design, and Introduction to QSAR & Computer aided drug design. [08]

Unit- II Mode of action, uses, SAR of the following classes of drugs included in latest edition of pharmacopoeia (synthetic procedures and assay of individually mentioned drugs only)

Cardiac glycosides & drug used for CHF- Digitoxin

Antiarrhythmic drugs- Propranolol, Procainamide

Antianginal drugs- Isosorbide mononitrate

Antihypertensive drugs-Captopril, methyldopa, Nifedipine. [08]

Anticoagulants- Heparin, warfarin

Antihyperlipidemics- Lovastatin, Clofibrate

Unit-III

Antispasmodic and Antiulcer drugs- Dicyclomine, Ranitidine, Omeprazole.

Antitussives- Dextromethorphen. [08]

Unit-IV: Analgesics and Antipyretics – Aspirin, Mefanamic Acid, Ibuprofen,

Diclofenac, Paracetamol [08]

Unit-V: Diuretics – Acetazolamide, Chlorthiazide; Furosemide, Spironolactone. [08]

PHR-603P

**PHARMACEUTICAL CHEMISTRY -VII
(MEDICINAL CHEMISTRY-II)
PRACTICAL**

1. Synthesis of atleast five selected drugs from the course content involving two or more steps.
2. Establishing the pharmacopoeial standards of the drugs synthesized.
3. Simple experiment demonstrating microwave assisted synthesis

BOOKS RECOMMENDED:

1. Thomas J. Perun, "Computer –aided Drug Design methods applications". PharmaMed Press, Hyderabad
2. Delgado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
3. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
4. Shri ram, / Yogeewari, medicinal chemistry, 2nd. Ed, Pearson education
5. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
6. Korolkovas, Essentials of medicinal chemistry, Wiley India
7. 8. Wermuth C G. The practice of Medicinal Chemistry-III, Academic press an imprint

- of Elsevier
 9 Pharmacopoeia of India 2010, Ministry of Health, Govt. of India.
 10. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
 11. Furniss B S, Hannaford A J, Smith P W G and Tathell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
 12. Latest edition of B.P.
 13. Latest edition of U.S.P.

PHR-604

PHARMACOLOGY-II

Unit-I:

Pharmacology of CVS: Cardiac glycosides, Antihypertensive drugs, Antianginal drugs, Antiarrhythmics, Antihyperlipidemics [09]

Unit-II:

Drugs Acting on Haemopoietic System

Haematinics, Vit. K & anticoagulants, Fibrinolytics & antiplatelet drugs, Plasma Volume expanders

Drugs Acting on Respiratory System

Anti-asthmatic drugs, Anti-tussives & Expectorants, Respiratory Stimulants [08]

Unit-III: NSAIDS & Anti-gout Drugs. Diuretics [08]

Unit-IV: Autocoids: Histamine, 5HT and their antagonists, Prostaglandins, Thromboxane, Leukotrienes, Angiotensin and Bradykinin [08]

Unit-V: Drugs acting on GIT

Antacids and Antiulcer drugs, Laxatives and antidiarrhoeal Agents, Emetics and antiemetics [07]

PHR-604P

**PHARMACOLOGY-II
PRACTICAL**

1. Relevant experiments based on theory syllabus

BOOKS RECOMMENDED:

1. Goodman & Gilman, The Pharmacological basis of Therapeutics, Editors:-JG Hardman, Le Limbird, PB Molinoss, RW Ruddon & AG Gil, Pergamon Press.
2. Bothara Sunil, Essentials of experimental in pharmacology, vol. 1, PharmaMed Press, Hyd.
3. Laurence, DR & Bannet PN; Clinical Pharmacology, Churchill Livingstone.
4. Rang MP, Date MM, Riter JM, Pharmacology Churchill Livingstone.
5. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
5. Barar FSK: Text Book of Pharmacology, Interprint, New Delhi.
7. Satoskar & Bhandarkar; Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay.
8. Turner, Screening methods in pharamacology, PharmaMed Press, Hyderabad
9. Ghosh, MN; 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.

PHR--605

PHARMACOGNOSY – III

Unit-I: (A) Study of the biological sources, Commercial varieties cultivation, collection adulterants, uses, diagnostic macroscopic and microscopic features and chemical constituents, substitutes and specific chemical tests of following groups of drugs containing.

Glycosides:

1. Saponins: Liquorice, Ginseng, Dioscorea, Coleus species. [04]

2. Cardioactive sterols: Digitalis, Squill, & Thevetia [03]

3. Anthraquinone Cathartics: Aloe, Senna, Rhubarb & Cascara. [03]

Unit-II: Others: Psoralea, majus, Ammi visnaga, Gentian, Saffron, Quassia and Andrographis paniculata. [03]

(B) Production and Utilization of phytoconstituents such as calcium sennosides, Diosgenin, Solasodine & Podophyllotoxins [03]

Unit- III: Studies on traditional drugs: Common Vernacular name, Biological sources, morphology, chemical nature of chief constituents, pharmacology, categories and common uses and toxicological activity of marketed formulations of following indigenous drugs : Amla, Kantkari, Satavari, Bhilwa, Vach, Rasna. [08]

Unit-IV: Punarnava, Chitrak, Apamarg, Gokhru, Shankhpushpi, Brahmi, Methi, Lehsun, Guggul, Gymnema, Shilajit, Tulsi and Neem. [08]

Unit-V: Brief Introduction and principles of Ayurvedic, Unani, Siddha and Homeopathic systems of medicines. Introduction to Herbal Pharmacopoeia, study of Arishtas, Asavas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas. [08]

PHR-605 P

PHARMACOGNOSY - III

PRACTICAL 11

1. Identification of atleast 10 crude drugs mentioned in theory
2. Powder microscopic study of atleast 5 drugs
3. Evaluation and standardization of atleast 3 marketed Ayurvedic formulations

BOOKS RECOMMENDED:

1. Trease, G.E., & Evans, W.C., Evans, W.C., "Pharmacognosy" Bailliere Tindall east Baorne, U.K.
2. Tyler V.E. et al : "Pharmacognosy" Lea & Febiger, Philadelphia.
3. Wallis. T.E, Practical pharmacognosy, 4rt. Ed, PharmaMed Press, Hyderabad.
4. Senger, A Texbook of pharmacognosy, PharmaMed Press
5. Nadkarni A.K. Indian Materia Medica 1-2, Popular Prakashan (P) Ltd. Bombay.
6. Atal C.K. & Kapur BM. "Cultivation & utilization of Medicinal plants, RRL, Jammu.
7. Harborne A J, Phytochemical methods, a guide to modern technics og plant analysis, PharmaMed Press, Hyderabad
8. The wealth of India, Raw Materials (All volumes) Council of Scientific & Industrial Research, New Delhi.

9. Compendium of Indian Medicinal Plants I-VII, Rastogi & Malhotra.
10. Indian Ayurvedic Pharmacopoeia, Govt. of India.
11. Kokate CK, Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan
12. Indian Pharmacopoeia.
13. Kokate C.K. "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
14. Wallis T.E. "Analytical Microscopy" J&A Churchill Ltd., London.
15. Harborne J.B.- "Phytochemical methods" Springer International
16. WHO guidelines
17. BP (Latest edition)
18. Standard botanicals by P. Mukharejee

PHR-606P

PROFESSIONAL COMMUNICATION-II

Unit-I

1. Written skills:
 - _ Proposal writings format
 - _ Report writings
 - _ Business letters
 - _ Applications
 - _ Covering letters
 - _ Curriculum Vitae Designing [10]

Unit-II

2. Productivity, Time Management simulation exercise
3. Leadership Skills.
4. Team work 'BSC' – Boss, Subordinates & Colleagues [06]

Unit-III

5. Group Discussions (G.D)
 - _ Tips
 - _ GD [08]

Unit-IV

6. Corporate behaviors, corporate expectation, office etiquettes.
7. Extempore [06]

Unit-V

8. Interview Tips:-
 - _ What student is supposed to do before the interview, during the interview, after the interview & on the day of interview.
 - _ Various questions that may be asked in an interview.
 - _ Model interview (Video-shooting & displaying optional)
9. Exit Interview [10]

BOOKS RECOMMENDED:

1. Elish, A handbook of English for professional, BS Publications, Hyderabad
2. Rubi Gupta, Basic technical communication, Foundation/BookWorld, Dehradun
3. Lesikar RV, Lesikar's Basic Business Communication.
4. Dianza, Business an professional communications, Pearson education.