

**BABU BANARASI DAS UNIVERSITY
LUCKNOW**

**SYLLABUS FOR
BACHELOR OF PHARMACY (B.PHARM.)**

SCHOOL OF PHARMACY

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-I, Semester-I

S.No.	Course code	Subject name	Sessional	Exam	Subject total
		Theory			
1.	BPH 111	Pharmaceutical Analysis-I	30	70	100
2.	BPH 112	Pharmaceutical Chemistry-I (Inorganic Pharm. Chem.)	30	70	100
3.	BPH 113	Pharmaceutics-I (Introduction to Pharmacy)	30	70	100
4.	BPH 114	Anatomy , Physiology and Pathophysiology-I	30	70	100
Practical Evaluation Day to Day					
5.	BPHP 111	Pharmaceutical Analysis-I	30	70	100
6.	BPHP 112	Pharmaceutical Chemistry-I (Inorganic Pharm. Chem.)	30	70	100
7.	BPHP 113	Pharmaceutics-I (Introduction to Pharmacy)	30	70	100
8.	BPHP 114	Anatomy , Physiology and Pathophysiology-I	30	70	100
General Proficiency					
9.	GP 01	General Proficiency			50
			240	560	850

Theory: 4

Practicals: 4

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-I, Semester-II

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 121	Pharmaceutical Chemistry-II (Organic Chemistry-I)	30	70	100
2.	BPH 122	Anatomy , Physiology and Pathophysiology-II	30	70	100
3.	BPH 123	Computer Fundamentals & Programming	30	70	100
4.	BPH 124	Pharmaceutical Biostatistics	30	70	100
Practical Evaluation			Day to Day		
5.	BPHP 121	Pharmaceutical Chemistry-II (Organic Chemistry-I)	30	70	100
6.	BPHP 122	Anatomy , Physiology and Pathophysiology-II- Project	30	70	100
7.	BPHP 123	Computer Fundamentals & Programming	30	70	100
8.	BPHP 124	Pharmaceutical Biostatistics	30	70	100
General Proficiency					
9.	GP 02	General Proficiency			50
			240	560	850

Theory: 4

Practicals: 4

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-II, Semester-III

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 231	Pharmaceutics-II (Unit Operations-I)	30	70	100
2.	BPH 232	Pharmaceutics-III (Physical Pharmacy)	30	70	100
3.	BPH 233	Pharmaceutical Chemistry-III (Organic Chemistry-II)	30	70	100
4.	BPH 234	Pharmacognosy-I	30	70	100
5.	BPH 235	Anatomy , Physiology and Pathophysiology-III	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 231	Pharmaceutics-II (Unit Operations-I)	30	70	100
7.	BPHP 232	Pharmaceutics-III (Physical Pharmacy)	30	70	100
8.	BPHP 233	Pharmaceutical Chemistry-III (Organic Chemistry-II)	30	70	100
9.	BPHP 234	Pharmacognosy-I	30	70	100
10.	BPHP 235	Anatomy , Physiology and Pathophysiology-III-Project	30	70	100
General Proficiency					
11.	GP 03	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-II, Semester-IV

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 241	Pharmaceutics-IV (Unit Operations-II including Engg. Drawing).	30	70	100
2.	BPH 242	Pharmaceutics-V (Pharmaceutical Microbiology & Biotechnology)	30	70	100
3.	BPH 243	Pharmaceutical Analysis-II	30	70	100
4.	BPH 244	Pharmacognosy-II	30	70	100
5.	BPH 245	Pharmaceutics-VI (Pharmaceutical Jurisprudence & Ethics)	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 241	Pharmaceutics-IV (Unit Operations-II including Engg. Drawing).	30	70	100
7.	BPHP 242	Pharmaceutics-V (Pharmaceutical Microbiology & Biotechnology)	30	70	100
8.	BPHP 243	Pharmaceutical Analysis-II	30	70	100
9.	BPHP 244	Pharmacognosy-II	30	70	100
10.	BPHP 245	Pharmaceutics-VI (Pharmaceutical Jurisprudence & Ethics)-Project	30	70	100
General Proficiency					
11.	GP 04	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-III, Semester-V

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 351	Pharmaceutical Chem.-IV (Biochemistry)	30	70	100
2.	BPH 352	Pharmaceutics-VII (Pharmaceutical Technology-I)	30	70	100
3.	BPH 353	Pharmacognosy-III	30	70	100
4.	BPH 354	Pharmaceutical Chemistry-V (Medicinal Chemistry-I)	30	70	100
5.	BPH 355	Pharmacology-I	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 351	Pharmaceutical Chem.-IV (Biochemistry)	30	70	100
7.	BPHP 352	Pharmaceutics-VII (Pharmaceutical Technology-I)	30	70	100
8.	BPHP 353	Pharmacognosy-III	30	70	100
9.	BPHP 354	Pharmaceutical Chemistry-V (Medicinal Chemistry-I)	30	70	100
10.	BPHP 355	Pharmacology-I	30	70	100
General Proficiency					
11.	GP 05	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012 Year-III, Semester-VI

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 361	Pharmaceutical Chem.-VI (Medicinal Chemistry-II)	30	70	100
2.	BPH 362	Pharmacology-II	30	70	100
3.	BPH 363	Pharmacognosy-IV	30	70	100
4.	BPH 364	Pharmaceutics –VIII (Biopharmaceutics & Pharmacokinetics)	30	70	100
5.	BPH 365	Pharmaceutics-IX (Community and Hospital Pharmacy)	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 361	Pharmaceutical Chem.-VI (Medicinal Chemistry-II)	30	70	100
7.	BPHP 362	Pharmacology-II	30	70	100
8.	BPHP 363	Pharmacognosy-IV	30	70	100
9.	BPHP 364	Pharmaceutics –VIII (Biopharmaceutics & Pharmacokinetics)	30	70	100
10.	BPHP 365	Pharmaceutics-IX (Community and Hospital Pharmacy)	30	70	100
General Proficiency					
11.	GP 06	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012

Year-IV, Semester-VII

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 471	Pharmaceutical Analysis III	30	70	100
2.	BPH 472	Pharmaceutics-X (Pharmaceutical Technology-II)	30	70	100
3.	BPH 473	Pharmacology-III	30	70	100
4.	BPH 474	Pharmaceutical Chemistry-VII (Medicinal Chemistry-III)	30	70	100
5.	BPH 475	Elective-I	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 471	Pharmaceutical Analysis III	30	70	100
7.	BPHP 472	Pharmaceutics-X (Pharmaceutical Technology-II)	30	70	100
8.	BPHP 473	Pharmacology-III	30	70	100
9.	BPHP 474	Pharmaceutical Chemistry-VII (Medicinal Chemistry-III)	30	70	100
10.	BPHP 475	Elective-I	30	70	100
General Proficiency					
11.	GP 07	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

STUDY AND EVALUATION SCHEME

Course : B. Pharm.

Effective From Session : 2011-2012

Year-IV, Semester-VIII

S.No.	Course code	Subject name	Session al	Exam	Subject total
		Theory			
1.	BPH 481	Natural Products	30	70	100
2.	BPH 482	Pharmaceutics-XI (Pharmaceutical Industrial Management)	30	70	100
3.	BPH 483	Environment and Ecology	30	70	100
4.	BPH 484	Elective -II	30	70	100
5.	BPH 485	Recent Advances in Pharmacy	30	70	100
Practical Evaluation			Day to Day		
6.	BPHP 481	Natural Products	30	70	100
7.	BPHP 482	Pharmaceutics-XI (Pharmaceutical Industrial Management)	30	70	100
8.	BPHP 483	Environment and Ecology	30	70	100
9.	BPHP 484	Elective -II Project	30	70	100
10.	BPHP 485	Recent Advances in Pharmacy	30	70	100
General Proficiency					
11.	GP 08	General Proficiency			50
			300	700	1050

Theory: 5

Practicals: 5

SYLLABUS

Course : B. Pharm.

Effective From Session : 2011-2012

Year-I, Semester-I

PHARMACEUTICAL ANALYSIS-I

THEORY

Unit-1 :

Significance of quantitative analysis in quality control, different techniques of analysis, preliminaries and definitions, precision and accuracy. Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards.

Unit-II:

Acid base concepts, role of solvents, relative strengths of acids and bases, ionization, law of mass action, pH, neutralization curves, polyprotic system, indicators, acid base indicators, theory of indicators, choice of indicators, mixed indicators.

Unit-III:

Buffer solution, buffer capacity, common-ion effect, hydrolysis of salts, Handerson-Hasselbach equation, polyamines and amino acid system, amino acid titrations

Unit-IV :

Concepts of oxidation reduction, redox reactions, strengths and equivalent weights of oxidizing and reducing agents, theory of redox titrations, redox indicators, oxidation reduction curves, iodimetry and iodometry, titrations involving cerium (IV) sulfate, potassium iodate, potassium permanganate, titanous chloride, sodium-2,6-dichlorophenolindophenol.

Unit-V: Precipitation Titrations:

Precipitation reactions, solubility products, effect of acids, temperature and solvent upon the solubility of precipitate. Argentometric titrations and titrations involving ammonium or potassium thiocyanate: Gaylussac method, Mohr's method, Volhard's method and Fajan's method. Mercuric nitrate indicators

BPHP 111 PHARMACEUTICAL ANALYSIS - 1

PRACTICAL

The students should be introduced to the main analytical tools through demonstration. They should have a clear understanding of a typical analytical balance, the requirements of a good

balance, weights, care & use of balance, methods of weighing, and errors in weighing. The students should also be acquainted with the general apparatus requiring various analytical procedures.

1. Standardization of analytical weights and calibration of volumetric apparatus.
2. Acid Base Titrations : Preparation and Standardization of acids and bases, some exercises related with determination of acids and bases separately or in mixture form, some official assay procedures, e.g. boric acid, should also be covered.
3. Oxidation Reduction Titrations : Preparation & standardization of some redox titrants e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to determinations of oxidizing & reducing agents. Exercises involving potassium iodate, potassium bromate, iodine solution and ceric ammonium sulphate.
4. Precipitation Titrations: Preparation and standardization of titrants like silver nitrate and Ammonium thiocyanate, titrations according to Mohr's, Volhards and Fajan's methods.

BOOKS RECOMMENDED :

1. Mendham J, Denney R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Connors K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.
3. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
4. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
5. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors
6. The Pharmacopoeia of India.

PHARMACEUTICAL CHEMISTRY-I
(Inorganic Pharmaceutical Chemistry)

UNIT- I

Sources of impurities & their control,

Limit test for Chloride, Sulphate, Iron, Lead, Heavy metals, Arsenic.

An outline of methods of preparation, source of impurities, tests for purity, identification and uses of inorganic pharmaceuticals as per Indian Pharmacopoeia (1996).

Pharmaceutical Aids & Necessities; Water, Glasses, Antioxidants & Preservatives.

UNIT- II

Gastrointestinal Agents; Acidifying agents (Dilute HCl),

Antacids (Aluminium Hydroxide, Calcium Carbonate, Magnesium Hydroxide)

Cathartics (Disodium Hydrogen Phosphate, Magnesium sulphate)

Protective & Adsorbents (Active Charcoal, Aluminium sulphate)

Dental Products; Dentifrices & Anticaries agents (Sodium Fluoride)

UNIT- III

Topical Agents; Protective (Calamine, Titanium dioxide, Talc, Kaolin)

Astringents (Zinc Sulphate, Alums),

Anti-infective (Boric acid, Hydrogen peroxide, Iodine & Iodine Povidone, Potassium Permanganate, Silver Nitrate).

Miscellaneous agents; Expectorant (Ammonium Chloride),

Gases & Vapors; Inhalants (Oxygen), Anesthetics (Nitrous Oxide)

Diagnostic agents.

UNIT- IV

Major Intra & Extra cellular electrolytes; Physiological ions, Acid- base balance,

Electrolytes used for replacement therapy (Calcium Lactate, Sod. Dihydrogen Phosphate, Sod.

Bicarbonate, Sod. Chloride, Potassium Chloride, Magnesium Chloride), Combination Therapy.

Essential & Trace elements; Iron & Haematinics (Ferrous Sulphate, Ferrous Gluconate, Ferric ammonium citrate)

Mineral Supplements (Cu, Zn, Cr, Mn, Sb, S, I).

UNIT- V

Inorganic Radio-Pharmaceuticals; Radioactivity, Standards & Units of radioactivity, Measurement of radioactivity, Radiation dosimeter, Handling, Hazards & Precaution for radioactive compounds, Applications of radiopharmaceuticals.

Co-ordination Compounds & Complexation; Transition elements, Chelates & their pharmaceutical importance, Poison antidotes (Sodium thiosulphate), Novel application of metals in Pharmacy.

BPHP 112 PHARMACEUTICAL CHEMISTRY-I (INORGANIC PHARMACEUTICAL CHEMISTRY)

List of Experiments

1. To perform limit test of chloride, sulphate, Iron, Heavy metal and arsenic in the given sample.
2. Salt analysis
3. Preparation of following compounds:-
 - Boric acid
 - Magnesium sulphate
 - Heavy magnesium carbonate
 - Calcium Carbonate
 - Alum
 - Zinc sulphate

BOOKS RECOMMENDED :

1. Block, J.H. Roche, E, Soine, T and Wilson, C., "Inorganic, Medicinal & Pharmaceutical Chemistry", Lea & Febiger.
2. Discher, C.A., et.al Modern Inorganic Pharmaceutical Chemistry, Waveland press.
3. Pharmacopoeia of India, 1996 edition.
4. Atherden L.M., Bentley and Drivers' "Text Book of Pharmaceutical Chemistry", Oxford University Press, London.

PHARMACEUTICS – I
(INTRODUCTION TO PHARMACY)

Unit-I

History of Pharmacy: Origin & development of pharmacy in India, China, Egypt, Greece and Europe, Scope of pharmacy, introduction to pharmacopoeias with special reference to IP, BP, USP & International Pharmacopoeia.

Pharmaceutical Additives: Colouring, flavouring & sweetening agents, Cosolvents, preservatives, surfactants antioxidants & their applications.

Unit-II

Preparation, packaging and labelling of: Solutions, mixtures, spirits, aromatic waters, tinctures, glycerins, paints, syrups, elixirs, mouthwashes, mucilages, lotions, liniments, inhalations, powders, lozenges, pills, tablet triturates, jellies, pastilles.

Unit-III

Introduction to dispensing pharmacy.

Prescription: Handling of prescription, source of errors in prescription, care required in dispensing procedures including labelling of dispensed products. General dispensing procedures including labelling of dispensed products.

Mixing: Theory of mixing, solid-solid, solid-liquid & liquid-liquid mixing equipments.

Unit-IV :

Pharmaceutical calculations : Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing receipes, reducing receipe, percentage solutions, alligation, alcohol dilution, proof spirit.

Unit-V

Size Reduction : Definition, Principles and laws Governing size reduction, factors affecting size reduction, principles, laws & factors affecting energy requirements for size reduction, different methods of size reduction, study of hammer mill, ball mill, fluid energy mill & disintegrator.

Size separation: Methods & equipments employed for size separation e.g. sieving, sedimentation, cyclone separator, elutriation methods.

BPHP 113 PHARMACEUTICS-I (INTRODUCTION TO PHARMACY)

I : Preparation of following classes of Pharmaceutical dosage forms (involving the use of calculations in metrology) as official in IP, BP, USP/NF.

a) Aromatic Waters

1. Chloroform water BP
2. Camphor Water BP
3. Rose Water NF

b) Solutions

1. Lysol solution IP
2. Strong Ammonium Acetate solution BP

c) Syrups

1. Simple syrup BP/USP/IP

d) Elixirs

1. Aromatic Elixirs USP/NF

e) Spirits

1. Aromatic Ammonia spirit BP

f) Powders

1. ORS Powder IP
2. Absorbable dusting powder USP/NF

g) Lotions

1. Calamine lotion IP
2. Amino benzoic acid lotion BP

h) Liniments

1. Methyl salicylate liniment BP
2. Turpentine liniment BP

i) Mucilage 1. Starch Mucilage IP

j) Glycerins 1. Kaolin Poultice BP

k) Inhalation 1. Benzoin Inhalation BP

l) Tinctures & Extracts

1. Infusion of Tea
2. Decoction of Senna
3. Compound benzoin tincture BP
4. Strong Ginger tincture BP
5. Liquorice liquid extract BP.

II: Experiments to illustrate principles of size reduction using Ball Mill.

_ Effect of size of balls, number of balls and time on the efficiency of ball mill.

III: Experiments to illustrate mixing efficiency.

_ Solid-Solid mixing.

BOOKS RECOMMENDED:

1. Pharmacopoeia of India, The Controller of Publications, Delhi.
2. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
3. Carter S.J., "Cooper and Gunn's Tutorial Pharmacy", CBS Publishers, Delhi.
4. Rawlins E.A., "Bentley's Text Book of Pharmaceutics", ELBS Bailliere Tyndall.
5. Lachman L, Liberman H.A and Kanig J.L., "Theory and Practice of Industrial Pharmacy", Lea and Febiger.
6. Cooper and Gunn's Dispensing for Pharmaceutical Students, CBS Publishers, New Delhi.
7. Aulton, M.E, Text Book of Pharmaceutics, Vol., I & II. Churchill Livingstone.
8. United States Pharmacopoeia (National Formulary).
9. Remington – "The science and practice of pharmacy" Vol. I & II. Mack Publishing Co., Pennsylvania.

ANATOMY PHYSIOLOGY & PATHOPHYSIOLOGY -I

Unit –I

Introduction to human body & organisation of human body. Functional & structural characteristics of cell. Detailed structure of cell membrane & physiology of transport process. Structural & functional characteristics of tissues- epithelial, connective, muscle and nerve.

Unit-II

Skeletal system

Structure, composition & functions of skeleton. Classification of joints, types of movements of Joints. Disorders of joints.

Unit-III

Anatomy & physiology of skeletal & smooth muscle, neurotransmission, physiology of skeletal muscle contraction, energy metabolism, types of muscle contraction, muscle tone.

Unit-IV

Haemopoietic system : Composition & function of blood & its elements, erythropoiesis, blood groups, blood coagulation. Disorders of blood.

Unit-V

Lymphatic System

Composition, formation ,circulation and functions of lymph, lymph node and spleen. Disorders of lymphatic system.

BPHP 114 ANATOMY, PHYSIOLOGY & PATHOPHYSIOLOGY -I

1. Study of compound microscope.
2. Preparation of blood Film and study of various types of blood cells.
3. Determination of Blood groups.
4. Determination of Hemoglobin.
5. Determination of Total Red Blood Cell Count.
6. Determination of Total Leukocyte count.
7. Determination of Erythrocyte Sedimentation Rate.
8. Determination of Blood Clotting Time.
9. Determination of Bleeding Time.
10. Determination of Specific Gravity of Blood.
11. Determination of Body Temperature and Pulse Rate.
12. Recording of Systemic Arterial blood Pressure.
13. Study of Human Skeletal System.
14. Study of different body tissues.
15. Study of Electrocardiogram.

BOOKS RECOMMENDED

1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
2. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
6. Tortora GJ, & Anagnodokos NP, Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi.
7. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
8. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
9. Robbins SL, Kumar V, Basic Pathology, WB Saunders.

SYLLABUS

Course : B. Pharm.

Effective From Session : 2011-2012 Year-I, Semester-II

PHARMACEUTICAL CHEMISTRY-II

(Organic Chemistry-I)

Unit-I

Structure and Properties: Atomic Structure, atomic orbital, molecular orbital, hybridization, sigma & Pi bond, covalent, electrovalent and co-ordinate bond, inductive effect, hyperconjugation, rearrangement, resonance, reaction intermediates, Classification & Nomenclature of organic compounds.

Unit-II

Isomerism, geometrical isomerism, stereochemistry including optical activity, stereoisomerism, specification of configuration and conformational analysis.

Unit-III

Important methods of preparation, reactions: Alkanes, alkenes, alkynes, dienes, alkyl halides, alcohols, aliphatic amines.

Unit-IV

Important methods of preparation, reactions of aliphatic compounds: Aldehydes and ketones, carboxylic acid & their derivatives, di & tricarboxylic acids, hydroxy acids.

Unit-V

α,β -unsaturated carbonyl compounds, compounds containing active methylene group and their synthetic importance: Acetoacetic ester and malonic ester.

Organometallic compounds: Preparation & synthetic application of Grignard reagent, organolithium compounds.

BPHP 121 PHARMACEUTICAL CHEMISTRY-II (Organic Chemistry-I)

1- To synthesize and submit 1-Phenyl-azo-2-naphthol.

- 2- To synthesize and submit Picric acid.
- 3- To synthesize and submit Benzil.
- 4- To synthesize and submit Iodoform.
- 5- To synthesize and submit 3-Methyl-1-phenyl pyrazole-5-one.
- 6- To synthesize and submit Acetyl salicylic acid.
- 7- To draw the ball and stick models of the given structures.
- 8- Write the IUPAC name of the given ball and stick models.
- 9- To identify the given geometrical isomers and assign configuration to the possible geometrical isomers.
- 10- To construct the conformational isomers by using ball and stick models.
- 11- To identify and assign absolute and relative configuration of compound by using ball and stick models.
- 12- To identify the elements (N, S, halogens) in the given sample.
- 13- To identify the nature of amino group (1, 2, 3) in the given sample.
- 14- To identify the nature of carbonyl group in the given sample.
- 15- To identify the nature of –OH group (1, 2, 3) in the given sample.

BOOKS RECOMMENDED:

1. Morrison, R.T., and Boyd R.N., Organic Chemistry, Prentice Hall of India Pvt. Ltd, New Delhi.
2. Finar, I.L., Organic Chemistry, Vol. I & II, ELBS/Longman.
3. Jain, M.K. Organic Chemistry, Sohan Lal Nagin Chand & Co. 60 B, Bunglaw Road, Delhi.
4. Hendrikson, Organic Chemistry.
5. Godly, E.W. "Naming organic compounds".
6. Kalsi, "Organic reactions Stereochemistry & Mechanism".
7. Mann, F.G, & Saunders, B.C., Practical Organic Chemistry, ELBS/ Longman.
8. Vogel A.I., Textbook of Practical Organic Chemistry, ELBS/Longman.

ANATOMY PHYSIOLOGY & PATHOPHYSIOLOGY –II

Unit-I

Central Nervous System : Organization of the nervous system. Structure and functions of different parts of brain and spinal cord. Reflex action, electroencephalogram, specialized functions of the brain. Cranial nerves and their functions. Spinal nerves and nerve plexuses.

Autonomic Nervous System: Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission in the A.N.S.

Unit-II

Sense Organs: Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell), and skin (superficial receptors). Disorders of sense organs like Glaucoma, cataract and hearing loss.

Unit-III

Digestive system: Parts of digestive system, their structure and functions. Various gastrointestinal secretions & their role. Pathology of disorders related to digestive system Peptic Ulcer, Ulcerative colitis, Crohn's disease, Zollinger- Ellison syndrome, Hepatitis, Cirrhosis of liver, pancreatitis.

Unit-IV

Urinary System – Anatomy & physiology of urinary system, physiology of urine formation, acid- base balance, pathophysiology of renal failure, glomerulonephritis.

Unit-V

Endocrine System – Anatomy & Physiology of pituitary, thyroid, parathyroid, adrenal, pancreas, control of hormone secretion, pathophysiology of hypo & hyper secretion of endocrine glands & their disorders e.g.- Diabetes mellitus, hyper/hypothyroidism.

BPHP 122 ANATOMY PHYSIOLOGY & PATHOPHYSIOLOGY –II

Project based on theory

BOOKS RECOMMENDED:

1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
2. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
6. Tortora GJ, & Anagnostikos NP, Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi.
7. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
8. Shalya Subhash, Human Physiology, CBS Publishers & Distributors.
9. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
10. Dipiro JL, Pharmacotherapy – A Pathophysiological Approach, Elsevier.
11. Robbins SL, Kumar V, Basic Pathology, WB Saunders.

COMPUTER FUNDAMENTALS AND PROGRAMMING

Unit-1

Definition and Overview of Computer, Computer classification, Computer Organization, Computer code, computer classification of Boolean algebra. Input Devices Output devices, Storage devices. Computer Software, Types of software. Overview of Computer Networks, LAN, MAN, WAN, Internet, Intranet, network topology. Internetworking: Bridges, Repeaters and Routers.

Unit-2

Introduction: Operating system and function, Evolution of operating system, Batch, Interactive, Time sharing and Real Time System. Single User Operating System and Multi-user Operating system, Compare MS-DOS vs. UNIX, Various window features. Internal and External commands in MS-DOS.

Unit- 3

Introduction to MS-OFFICE-2003, word 2003 Document creation, Editing, formatting table handling, mail merge, Excel-2003, Editing, working Retrieval, Important functions, short cut keys used in EXCEL.

Unit 4

MS-Power point 2003-Job Profile, Elements of Power point , ways of delivering Presentation, concept of Four P's (Planning , Preparation, Practice and Presentation) ways of handling presentations e.g. creating, saving slides show controls, Adding formatting, animation and multimedia effects. Database system concepts, Data models schema and instance , Database language, Introduction to MS-Access 2003, main components of Access tables, Queries, Reports, Forms table handling, working on Query and use of database.

Unit- 5

Computer applications in Pharmaceutical and clinical studies, uses of Internet in Pharmaceutical Industry

BPHP 123 Computer Fundamentals and Programming

Software Lab to be used for the following:-

1. Windows, Managing Windows, Working with Disk , Folders and files.
2. MS-Office 2003 (MS Word, MS Power point, MS Excel, MS Access).
3. Computer Operating System Like DOS and Windows.
4. Internet Features (E-mail, Browser etc.)

BOOKS RECOMMENDED:

1. Sinha, R.K., Computer Fundamentals, BPB Publications.
2. Raja Raman, V, Computer Programming in 'C', PHI Publication.
3. Hunt N and Shelley J. "Computers and Common Sense" Prentice Hall of India.
4. N.K.Tiwari," Computer fundamentals with Pharmacy Applications".
5. G.N.Rao, " Biostatistics & computer Applications".

PHARMACEUTICAL BIOSTATISTICS

Unit-I

- a. Method of collection of data
- b. Diagrammatic representation of data (Pie, Histogram, Bar, Circular diagram)
- c. Classification and tabulation of data.
- d. Sampling-Types of sampling, Merits and limitations of sampling, Sampling errors and non sampling errors.

Unit-II

Measure of central tendency for discrete and continuous data.

- a. Mean, types of means.
- b. Median
- c. Mode

Measure of dispersion

- a. Quartile deviation
- b. Mean deviation
- c. Standard error of Mean (SEM)

Unit-III

- a. Skewness and Kurtosis
- b. Correlation and regression analysis
- c. Method of least square in straight line

Unit-IV

Statistical Inferences- Confidence (fiducial) limit.

Test- Hypothesis- t-test, z-test, χ^2 –test, F- test (variance ratio)

Analysis of variances- one way and two way classification, Nonlin
(ANOVA)

Unit-V

a. Theory of Probability- Simple Probability

Addition Probability

Multiplication Probability

b. Binomial distribution- Fit of Binomial

c. Poisson distribution- Fit of Poisson

d. Normal distribution –Fit of Normal

BOOKS RECOMMENDED:

1. A textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-IV.
2. Gupta S.P. Statistical Methods, Sultan Chand and Co., New Delhi.
3. Greval B.S., Higher Engineering Mathematics, Khanna Publication, New Delhi.
4. Boltan's Pharmaceutical Statistics, Practical and Clinical Application, Marcel Dekker, N.Y.
5. Khan, Khanum," Biostatistics for Pharmacy".

SYLLABUS

Course : B. Pharm.

Effective From Session : 2012-2013 Year-II, Semester-III

BPH 131 Pharmaceutics-II (Unit Operations-I)

Unit-I

Unit Operations: Introduction, basic laws, Stoichiometry, Unit process, material and energy balances, molecular units, mole fraction, tie substance, gas laws, mole volume, primary and secondary quantities, equilibrium state, rate process, steady and unsteady states, dimensionless equations, dimensionless formulae, dimensionless groups, and different types of graphic representation.

Fluid Flow: Types of flow, Reynold's number, Viscosity, Concept of boundary layer, basic situations of fluid flow, valves, flow meters, manometers and measurement of flow and pressure.

Unit-II

Water systems – Raw water, soft water, purified water, water for injection, quality requirement and treatment of water. Washing, cleaning and standardization of cleaning.

Filtration and Centrifugation : Theory of filtration, filter aids, filter media, industrial filters including filter press, rotary filter, edge filter. Optimum cleaning cycle in batch filters, Factors affecting filtration, Principles of centrifugation, Industrial centrifugal filters and centrifugal sedimenters.

Unit-III

Crystallization: Characteristics of crystals like-purity, size, shape, geometry, habit, forms size and factors affecting them, Solubility curves and calculation of yields. Material and heat balances around Swenson Walker Crystallizer. Supersaturation theory and its limitations, Nucleation mechanisms, crystal growth, Study of various types of Crystallizer, Tanks, agitated batch, Swenson Walker, Single vacuum, circulating magma and Krystal crystallizer, Caking of crystals and its prevention. Mathematical problems.

UNIT – IV

Heating, Ventilation & AC Systems: Basic concepts and definition, wet bulb and adiabatic saturation temperatures, Psychometric chart and measurement of humidity, application of humidity measurement in pharmacy, equipment for dehumidification operations. Principles and applications of refrigeration and air conditioning.

UNIT-V

Material of Construction: General study of composition, corrosion, resistance, Properties and applications of the materials of construction with special reference to stainless steel and glass.

Industrial Hazards and Safety Precautions: Mechanical, Chemical, Electrical, fire and dust hazards. Industrial dermatitis, Accident record.

BPHP 131- Practicals based on theory syllabus.

Books Recommended :

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw
2. Hill International Book Co., London.
3. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
4. McCabe W.L. and Smith J.C. Unit Operation of Chemical EngineerinInternational Book Co., London.
5. Sambhamurthy, Pharmaceutical Engineering, New Age Publishers.

BPH 132 Pharmaceutics-III (Physical Pharmacy)

Unit-I

(A) Matter, properties of Matter : States of matter, change in the state of matter, latent heats and vapor pressure, sublimation critical point, Eutectic mixtures, gases, relative humidity, liquid complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism

(B) Kinetics and Drug Stability : General considerations & concepts, Degradative path ways, half life determination, Influence of temperature, light, solvent, catalytic species and other factors, Accelerated stability study, expiration dating. ICH guidelines for stability

(C) Phase equilibria : Phase, component, degree of freedom, phase rule (excluding derivation). Cooling curves & Phase diagrams for one & two component system involving eutectics, congruent & incongruent melting point (examples-water, sulphur, KI-H₂O, NaCl-H₂O system). Distribution law & application to solvent extraction.

Unit-II

Micromertics and Powder Rheology : Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle volume, optical microscopy, sieving, sedimentation, measurement, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

Unit-III

Surface and Interfacial Phenomenon : Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions, spreading coefficient, adsorption at liquid interfaces, active agents, HLB classification, solubilization, detergency, adsorption at solid interfaces, solid- gas and solid-liquid interfaces, complex films, electrical properties of interface.

Unit-IV

Viscosity and Rheology : Newtonian systems, Law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotrophy, thixotropy in formulation, determination of viscosity, capillary, falling ball, rotational viscometers.

Complexation : Classification of complexes, methods of preparation and analysis, applications.

Unit-V

Dispersion Systems : Colloidal Dispersions : Definition, types, properties of colloids, protective colloids, application of colloids in pharmacy; Suspensions and Emulsions; Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian

movement, sedimentation of flocculated particles, sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations; Emulsions-types, theories, physical stability.

BPHP 132-Practicals based on theory syllabus.

Books Recommended :

1. Martin A, Bustamante P. & Chun A.H.C- Physical Pharmacy, Lea & Febiger, Philadelphia.
2. Shotten E & Ridgaway K, Physical Pharmaceutics, Oxford University Press, London.

BPH 133 Pharmaceutical Chemistry-III (Organic Chemistry-II)

Unit-I

α , β - Unsaturated carbonyl compounds, cycloaddition. Compounds containing active methylene group and their synthetic importance- Acetoacetic ester and malonic ester. Polynuclear hydrocarbons-Napthalene, anthracene and phenantherene.

Unit - II

Heterocyclic Compound – Nomenclature, Chemistry, preparation, properties and pharmaceutical importance of pyrrole, furan, thiophene, pyridine, pyrimidine, imidazole, pyrazole, thiazole, benzimidazole, indole, phenothiazines.

Unit-III

Name reactions – Definition, reaction mechanism and synthetic application of Merwin – Ponderoff, Verley reduction, Oppeneaur oxidation, Bechmann rearrangement, Mannich reaction, Diel's alder reaction, Michel, Reformatsky, Knoevanegal reaction, Benzoin condensation.

Unit-IV

Classification, structure, reactions, structure elucidation, identification of :

a) Carbohydrates

- i) Monosaccharides – Glucose and fructose. ii) Disaccharides – Sucrose, lactose and maltose.
- iii) Polysaccharides – Starch.

Unit-V

Classification, identification, general methods of preparation and reactions of amino acids and proteins. Structure of Nucleic Acids. Chemistry & identification of oils, fats and waxes. Polymers and polymerisation.

BPHP 133-PRACTICAL

1. Identification of organic compounds and their mixture with derivatization.
2. Synthesis of Organic Compounds involving two steps.
3. Determination of Iodine value , sap value, Acid value, Ester value of oils, fats and waxes.

Books Recommended

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.

2. Furniss B S, Hannaford A J, Smith P W G and Tatehell A R, Vogel's Textbook of Practical Organic Chemistry, The ELBS/ Longman, London.
3. Morrison, T.R. and Boyd, R.N., Organic Chemistry, Prentice Hall of India, Private Limited, New Delhi.
4. Finar, I.L., Organic Chemistry Vol. I & II, ELBS/Longman.
5. Jain, M.K. and Sharma S.C, Organic Chemistry, Shoban Lal Nagin Chand & Co., Delhi.
6. Kalsi," Organic Reactions Stereochemistry & Mechanism".

BPH 134 Pharmacognosy-I

Unit-I : Definition history, scope & development of Pharmacognosy.

- 1. Source of Drug :** Biological, marine, mineral and plant tissue cultures as source of drugs. Marine pharmacognosy, Novel medicinal agents from marine sources.
- 2. Classification of Drugs :** Alphabetical, Morphological, taxonomical, chemical & pharmacological.

Unit-II : 3. Plant taxonomy : Study of following families with special reference to medicinally important plants – Apocynaceae, Solanaceae, Rutaceae, Cruciferaeae, Leguminosae, Rubiaceae, Liliaceae, Labitae, Graminae, Umbelliferaeae, Papaveraceae.

Unit-III : 4. Cultivation, Collection, Processing & Storage of crude drugs :

- A. Factors influencing cultivation of medicinal plants, Type of Soils & fertilizers of common use.
- B. Pest & Pest Management ,natural pest control agents.
- C. Plant hormones and their applications.
- D. Polyploidy, Mutation & hybridization with reference to medicinal plants.
- E. Poly Houses/ Green Houses for cultivation.

Unit-IV : 5. Quality Control of crude drugs : Adulteration of crude drugs and their detection by organoleptic, microscopic, physical, chemical and biological methods of evaluation including Quantitative microscopy. WHO guidelines for standardisation of medicinal plants.

Unit-V : 6. Systematic pharmacognostic study of following : a) Carbohydrates & derived products : Agar, Guar gum, acacia, Honey, Isabgol, pectin, starch,sterculia & tragacanth. b) Lipids – Beeswax, castor oil, Cocabutter, Kokum butter, hydnocarpus oil, Codliver oil, shark liver oil, Linseed oil, wool fat, Rice-bran oil, Lard & Suet.

BPHP 134-PRACTICAL

1. Morphological characteristics of plant families mentioned in theory.
2. Microscopical Measurements of cell & cell contents Starch grains, Calcium oxalate Crystals & Phloem Fibres.
3. Determination of leaf Constants such as Stomatal index, Stomatal number, Vein islet number, Vein determination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates & lipids.
5. Preparation of herbarium sheets.

SUGGESTED PRACTICALS

1. Study of Plants belonging to family Solanaceae.
2. Study of Plants belonging to family Rutaceae.
3. Study of Plants belonging to family Liliaceae
4. Study of Plants belonging to family Umbelliferae.
5. Microscopical measurements of starch grains (Wheat, Maize).
6. Microscopical measurements of starch grains (Rice, Potato).
7. Various types of calcium-oxalate crystals, their study and microscopical measurements (Rhubarb, Senna, Liquorice etc.)
8. Study of various types of phloem fibres.
9. Determination of stomatal number with the help of camera lucida along with the working of instrument.
10. Determination of stomatal index.
11. Determination of vein-islet and vein termination number.
12. Determination of palisade ratio.
13. Chemical Tests of Agar, Acacia, Sterulia and Tragacanth.
14. a) Chemical tests of Pectin, Starch and Honey. b) Swelling factor of Isapaghula husk.
c) Average weight of Ispaghula husk.
15. Physical characteristics of Caster oil, Cod-liver oil, Shark-liver oil and Linseed oil.

Books Recommended

1. Trease, G.E. & Evans, W.C., "Pharmacognosy" Bailleire Tindall East bourne, U.K.
2. Wallis, T.E., Text book of Pharmacognosy, J.A. Churchill, Ltd
3. Wallis T.E., Analytical Microscopy, J&A Churchill Limited, London.
4. Brain K.R. and Turner T D. "The Practical Evaluation of Phyto Pharmaceutical", Wright, Scientehnica- Bristol.
5. Schewer PJ, "Marine Natural products", Academic press, London.
6. Mohammed Ali, " Pharmacognosy & Phytochemistry".

BPH 135 Anatomy , Physiology and Pathophysiology-III

Unit-I

Cell injury & Adaption-Courses of cell injury, pathogenesis & morphology of cell injury. Cellular AS daptation- Atropy, hypertrophy, aplasia, metaplasia, & dysplasia,intracellular accumulation & pathophysiology of Neoplasm.

Basic mechanisms involved in the process of inflammation and repair Alterations in vascular permeability and blood flow, migration of WBC's mediators of inflammation. Brief outline of the process of repair.

Unit-II

Respiratory System – Anatomy & function of respiratory structures, Mechanism of respiration, regulation of respiration, pathophysiology of Asthma, Pneumonia, Bronchits, Emphysema, Tuberculosis.

Unit-III

Cardiovascular System – Functional Anatomy of heart, conducting system of heart, cardiac cycle, ECG (Electro cardiogram). Pathophysiology of hypertension, Angina, CHF, myocardial infarction, cardiac arrhythmias, Ischaemic heart disease, Arteriosclerosis.

Unit-IV

Reproductive System- Male & Female reproductive system. Menstruation, pathophysiology of sexually transmitted diseases, spermatogenesis, oogenesis, pregnancy.

Unit-V

Pathophysiology of Joints disorder – Arthritis, gout, myasthenia gravis, spasticity, tetany, fatigue. Pathophysiology of anaemia, AIDS, hypersensitivity, allergic conditions, psychosis, epilepsy, Parkinson & Alzheimer's diseases pathophysiology of cataract, glaucoma etc.

BPHP 135-Project based on theory syllabus.

Books Recommended :

1. Difore SH, "Atlas of Normal Histology" Lea & Febiger Philadelphia.
2. Chaurasia B.D, Human Anatomy, Regional & Applied Part I, II & III, CBS Publishers & Distributors, New Delhi.
3. Guyton AC, Hall JE., Text book of Medical Physiology, WB Saunders Company.
4. Chatterjee C.C. Human Physiology, Medical Allied Agency, Calcutta.
5. Ross & Wilson, Anatomy & Physiology in Health & Illness, Churchill Livingstone.
6. Tortora GJ, & Anagnostikos NP, Principles of Anatomy & Physiology, Harper & Rave Publishers, New Delhi.
7. Parmar N.S., Health Education & Community Pharmacy CBS Publishers, Delhi.
8. Shalya Subhash, Human Physiology, CBS Publishers & Distributors.
9. Keele, C.A., Niel, E and Joels N, Samson Wright's Applied Physiology, Oxford University Press.
10. Dipiro JL, Pharmacotherapy – A Pathophysiological Approach, Elsevier.
11. Robbins SL, Kumar V, Basic Pathology, WB Saunders.

SYLLABUS

BPH 141 Pharmaceutics-IV (Unit Operations-II including Engg. Drawing)

Unit-I

Heat Transfer: Applications, modes of heat transfer, Fourier's law, film coefficients, Boltzmann's law, steam & electricity as heating media, radiations, black body, heat exchangers and heat interchangers

Mass Transfer: Principle, streams in mass-transfer operations, solid/fluid and fluid/fluid mass transfer, influence of mass transfer on unit operations.

Unit-II

Evaporation: Basic concepts of phase equilibria, factor affecting evaporation, evaporator, film evaporators, single effect and multiple effect evaporator.

Unit -III

Distillation : Raoult's law , Phase Diagrams , volatility, simple steam and flash distillations , principles of rectification, McCabe Thiele method for the calculations of number of theoretical plates, Azeotropic and extractive distillation .

Unit –IV

Drying : Moisture content and mechanism of drying , rate of drying and time of drying calculations, classification and type of dryers , dryers used in pharmaceutical industries – Tray dryer, Fluidized bed dryer, spray dryer and special drying methods. [08]

Unit-V

Automated Process Control Systems: Process variables, temperature, pressure, flow level and vacuum and their measurements. Elements of automatic process control and introduction to automatic process control systems. Elements of computer aided manufacturing (CAM). Reactors and fundamentals of reactor design for chemical reactions.

Pilot Plant Scale up Techniques: Concepts of pilot plant scale up techniques in pharmaceutical industries.

BPHP 141-Practicals based on theory syllabus.

Books Recommended

1. Badger W.L. and Banchero J.T. Introduction to Chemical Engineering Mc Graw Hill International Book Co., London.
2. Perry R.H. & Chilton C.H. Chemical Engineers Handbook, Mc Graw Kogakusha Ltd.
3. McCabe W.L. and Smith J.C. Unit Operation of Chemical Engineering Mc Graw Hill International Book Co., London.
4. Sambhamurthi Pharmaceutical Engineering, New Age Publishers.

BPH 142 Pharmaceutics-V (Pharmaceutical Microbiology & Biotechnology)

Unit -I

1. Importance of microbiology in pharmacy; Structure of bacterial cell; Classification of microbes and their taxonomy: Actinomycetes, bacteria, rickettsiae, spirochetes and viruses.
2. Identification of Microbes: Stains and types of staining techniques, electron microscopy; Nutrition, cultivation, isolation of bacteria, actinomycetes, fungi, viruses, etc.

Unit –II

Control of microbes by physical and chemical methods: Disinfection, factors influencing disinfectants, dynamics of disinfection, disinfectants and antiseptics and their evaluation

1. Sterilization: different methods, validation of sterilization methods & equipments; Types of materials for sterilization, packing of materials prior to sterilization, sterilization equipments, Supply of sterile materials. Microbial assays of antibiotics, vitamins & amino acids

Unit -III

Genetic Recombination

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 Activase, Humulin, Humatrope etc.

Unit -IV

Antibiotics

Historical development of antibiotics. Antimicrobial spectrum and methods used for their standardization. Screening of soil for organisms producing antibiotics, fermenter, its design, control of different parameters. Isolation of mutants, factors influencing rate of mutation. Design of fermentation process. Isolation of fermentation products with special reference to penicillins, streptomycins tetracyclines and vitamin B12.

Unit -V

Immunology and Immunological Preparations:

Principles, antigens and heptans, immune system, cellular/ humoral immunity, immunological tolerance, antigen-antibody reactions and their applications. Hypersensitivity, active and passive immunization. Vaccines and sera: their preparation, standardization and storage.

BPHP 142-Practicals based on theory syllabus.

BPH 143 Pharmaceutical Analysis-II

Unit-I

Theoretical considerations and application in drug analysis and quality control by the following analytical techniques

(A) Non-aqueous titrations. Acidic and basic drugs, solvents used and indicators, Assay of drugs by non-aqueous titrations with special reference to nitrazepam, chlorpromazine, ethosuccimide.

(B) Complexometric titration. Principle, types of complexing titrations, complexing agents used as titrants, indicators, masking and demasking, Complexometric titrations of some drugs with special reference to alum, calcium gluconate injection, determination of hardness of water

Unit-II

Miscellaneous methods of analysis :

(A) Diazotization titrations, Kjeldahl method of Nitrogen estimation, Karl- Fischer titration,

(B) Introduction to chromatography TLC, Column, Paper. [

Unit-III

Densitometry – Introduction, Dielectric cell, electrode potential, Nernst equation, salt bridge, standard potential, reference and indicator electrodes, measuring the relative voltage of cell.

A. Potentiometry : General principles, instrumentation and applications.

B. Conductometry : General Principles, instrumentation and applications.

Unit-IV

Gravimetric Analysis:

Precipitation techniques, solubility products, the colloidal state, supersaturation, coprecipitation, post-precipitation, digestion, washing of the precipitate, filtration, filter papers and crucibles, Ignition, thermogravimetric curves, specific examples like barium as barium sulphate, aluminium as aluminium oxide, organic precipitants.

Unit-V

Polarography and Amperometry- General principles, Instrumentation and Applications

BPHP 143-PRACTICAL

1. Non-aqueous Titrations : Preparation and standardization of perchloric acid and sodium/potassium methoxide solutions, Estimation of some pharmacopoeial products.
2. Complexometric Titrations : Preparation and standardization of EDTA solution some exercise related to pharmacopoeial assays by Complexometric titrations.
3. Miscellaneous Determinations : Exercise involving Diazotization, Kjeldahl, Karlfisher.
4. Exercise based on acid base titration in aqueous and non-aqueous media, oxidation reduction titrations using potentiometric technique, determination of acid base dissociation constants and plotting of titration curves using pH meter.
5. Exercises involving conductometric titrations.
6. Exercises based on paper, column and thin- layer chromatography.

Books Recommended :

1. Beckett, A H and Stenlake, J.B, Practical Pharmaceutical Chemistry, Vol, I and II, The Athlone Press of the University of London.
2. Pharmacopoeia of India, published by The Controller of Publications, Delhi.
3. British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
4. Mendham J, Denny RC, Barnes, J.D. Thomas M.J.K. "Vogel's Text Book of Quantitative chemical" Pearson Education Asia.
5. Connors KA, A Textbook of Pharmaceutical Analysis, Wiley Intescience, New York.
6. G.Vidya Sagar," Instrumental Methods of drug Analysis".

BPH 144 Pharmacognosy-II

Unit-I

Resins : Study of drugs containing Resins and Resin Combination like Podophyllum, Cannabis, Capsicum, Shellac, Asafoetida, Balsam of tolu, Balsam of peru, Benzoin, Turmeric, Ginger.

Unit-II

Volatile oils : General methods of obtaining volatile oils from plants, Study of volatile oils from Mentha, Coriander, Cinnamon, Jatamansi, Cumin, Black pepper, Cassia, Lemon peel, Orange peel, Lemon grass, Citronella, Caraway, Dill, Spearmint, Clove, Fennel, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Valerian, Musk, Palmarosa, Gaultheria, Sandalwood.

Unit-III

Phytochemical Screening : An introduction to active constituents of drugs : Their isolation, classification and properties with Qualitative chemical tests of the followings – Alkaloids, Saponins, Cardenolides and bufadienolides, flavonoids and Leucoanthocyanidine, cyanogenetic glycosides.

Unit-IV

Fibres : Study of fibres used in pharmacy such as cotton, silk, wool, nylon, glasswool, polyester and asbestos.

Pharmaceutical aids :- Study of Pharmaceutical aids like Talc, Diatomite, Kaolin, Bentonite, Fullers earth, Gelatin and Natural colors.

Unit-V

Tannins : Study of tannins & tannin containing drugs like Gambier (Pale Catechu), Black Catechu, Gall and Myrobalans (Harde, Baheda, Arjuna & Ashoka).

Utilization of aromatic plants & desired products will special reference to Sandalwood oil, Mentha oil, Lemon grass oil, Vetiver oil, Geranium oil & Eucalyptus oil.

Role of aromatic plants in national economy.

BPHP 144-PRACTICAL

1. Identification of crude drugs mentioned in theory.
2. Study of fibres and pharmaceutical aids.

3. Microscopic study of seven selected drugs and their powders mentioned under the category of volatile oils in theory with their chemical tests.
4. General chemical test for Alkaloids, Glycosides, Steroids, Flavonoids & Tannins.

SUGGESTED PRACTICALS

1. Morphology of Mentha, Lemongrass, Nutmeg and chenopodium.
2. Morphology of Turmeric, Ginger, Cannabis, Eucalyptus.
3. Morphology and microscopy of Coriander and Cinnamon.
4. Morphology and microscopy of Dill and Caraway.
5. Morphology and microscopy of Cardamom and Fennel.
6. Morphology and microscopy of Clove and to study its transverse section.
7. Study of Cotton, Silk and Wool along with their chemical Tests.
8. To study the morphology and chemical tests of Talc, Diatomite, and Kaolin.
9. Morphology and microscopy of Bentonite, Gelatin and natural colours (Saffron).
10. To perform the chemical tests of Balsam (Tolu and Peru) and Asafoetida.
11. Preparation of reagents for the chemical tests of Alkaloids and to perform the chemical tests on any Alkaloid containing drug.
12. Test for identification of Glycosides (Saponin and Anthraquinone).
13. Test for identification of Tannins.
14. Tests for identification of steroids.
15. Tests for identification of flavonoids.

PROJECT WORK : Utilization of Aromatic plants; ((Monograph)).

Books Recommended

1. Trease G.E., & Evans W.C., "Pharmacognosy" Balliere Tindall East Bourne U.K.
2. Tyler V.E. et al "Pharmacognosy" Lea & febiger, Philadelphia.
3. Wallis, T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd, London.
4. Kokate C.K. et al "Pharmacognosy" Nirali Prakashan, Pune.
5. Atal C.K. & Kapur BM, "Cultivation & utilization of Medicinal plant, RRL, Jammu.
6. Harborne J B, Phytochemical method, Chapman & Hall International Edition, London.
7. Mohammed Ali," Pharmacognosy & Phytochemistry".

BPH 145 Pharmaceutics-VI (Pharmaceutical Jurisprudence & Ethics)

Unit-1

Introduction

1. **Pharmaceutical Legislations** – A brief review.
2. **Drugs & Pharmaceutical Industry** – A brief review.
3. **Pharmaceutical Education** – A brief review.
4. **Pharmaceutical Ethics**

Unit-II

An elaborate study of the following:

- (A) Pharmacy Act 1948
- (B) Drugs and Cosmetics Act 1940 and Rules 1945

Unit-III

- (C) Medicinal & Toilet preparations (Excise duties Act 1955)
- (D) Narcotic Drugs & Psychotropic Substances Act 1985 & Rules.
- (E) Drugs Price Control Order 1995

Unit-IV

A brief study of the following with special reference to the main provisions.

- (A) Poisons Act 1919
- (B) Drugs and Magic remedies (Objectionable Advertisements) Act 1954.
- (C) Medical termination of Pregnancy Act 1970 & Rules 1975.
- (D) Prevention of Cruelty to Animals Act 1961.
- (E) States Shops & Establishments Act & Rules.

Unit-V

- (F) A.I.C.T.E. Act 1987
- (G) Patents Act 1970 (H) U.S Food and Federal D&C Act

Note : The teaching of all the above Acts should cover the latest amendments.

BPHP 145-Project based on theory syllabus.

Books Recommended

1. B.M., Mittal, Textbook of Forensic Pharmacy, National Book Centre, Dr. Sundari Mohan Avenue, Calcutta.
2. Relevant Acts & Rules Published by the Govt. of India.
3. N.K. Jain, A Textbook of Forensic Pharmacy, Vallabh Prakashan, N. Delhi.
4. Singh, Harkishan "History of Pharmacy in India- Vol.-I, II & III" Vallabh Prakashan.

SYLLABUS

Course : B. Pharm. Effective From Session : 2012-2013 Year-III, Semester-V

BPH 151 Pharmaceutical Chem.-IV (Biochemistry)

Unit-I

Enzymes :Nomenclature, enzymes-kinetics and mechanism of action, mechanism of inhibition of enzymes and isoenzymes in chemical diagnosis.

Co-enzymes:Vitamins as co-enzymes and their significance. Metals as co-enzymes and their significance.

Unit-II

Carbohydrate metabolism : Glycolysis, Gluconeogenesis and Glycogenolysis. Metabolism of galactose and galactosemia. Role of sugar nucleotides in biosynthesis and pentose phosphate pathway.

The citric acid cycle, significance, reactions and energetics of the cycle.

Unit-III

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.

Biological Oxidation : The respiratory chain, its role in energy capture & control, Energetics of oxidative phosphorylation, mechanism of oxidative phosphorylation.

Unit-IV

Biosynthesis of amino acids, catabolism of amino acids and conversion of amino acids to specialized products, biosynthesis of purine and pyrimidine., formation of deoxyribonucleotides.

Biosynthesis of RNA, DNA replication, Carcinogenesis & DNA repair mechanism.

Unit-V

Genetic Code and Protein synthesis, components of protein synthesis, inhibition of protein synthesis.

BPHP 151-Practical based on theory syllabus

BOOKS RECOMMENDED :

1. Jayaraman J., Laboratory Manual in Biochemistry, Wiley Eastern Limited.
2. Plummer, David J., An Introduction to Practical Biochemistry, Mc Graw Hill, New Delhi.
3. Singh S.P., Practical Manual to Biochemistry, CBS Publisher, New Delhi.
4. "Harpers Review of Biochemistry" Lange Medical Publication.
5. Conn E.E. & Stumph P.K., Outline of Biochemistry, John Willery & sons, New York.

6. Nelson DL & Cox MM, Lehninger Principles of Biochemistry, Macmillan Worth Publishers
7. Stryer L., Biochemistry, WH, Freeman & Company, San Francisco.
8. Harrow B. & Mazur A., Text book of Biochemistry, W.B. Saunders Co., Philadelphia.
9. Narayanan P., Bioinformatics- A Premier, New Age International Publishers Delhi.
10. Nelson, L.David, 'Lehninger, Principles of Biochemistry'.

BPH 152 Pharmaceutics-VII (Pharmaceutical Technology-I)

Unit-I

Preformulation studies :Study of physical properties of drug like physical form, particle size, shape, density, wetting, dielectric constant, Solubility, dissolution and organoleptic properties and their effect on formulation, stability and bioavailability.

Chemical properties like hydrolytic degradation and oxidation.

Unit-II

Liquid Dosage Forms : Introduction, types of additives used in formulations, vehicles, stabilizers, preservatives, suspending agents, emulsifying agents, solubilizers, colors, flavours and others, Manufacturing packaging & evaluation of clear liquids, suspensions and emulsions.

Unit-III

Semisolid Dosage Forms : Definitions, types, mechanisms of drug penetration, factors influencing penetration, semisolid bases and their selection, General formulation of semisolids, clear gels & manufacturing procedure, evaluation and packaging.

Unit-IV

Suppositories : Ideal requirements, bases, displacement value, manufacturing procedure, packaging and evaluation.

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

Unit-V

Cosmetology and cosmetic Preparations : Structure of skin, formulation and packaging of cold cream, vanishing cream, cleansing cream, all purpose cream, protective cream, antiperspirants, deodorant, face powder. Hair structure, Shampoos, Conditioner, Shaving and after shaving products, Dentifrice & Mouthwash, Lipstick, Nail lacquer and removers, Eye-lashes, baby-care Products.

BPH 152-Practicals based on theory syllabus.

Books Recommended

1. Remington's Pharmaceutical Sciences, Vol. I & Vol. – II, Mack Publishing Co., U.S.A.
2. J.W. Cooper, & G. Gunn, Tutorial Pharmacy, Petman Books Ltd., London.
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 R.L. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
6. Harrys Cosmetology
7. Balsam and Sagarin, Cosmetics: Science and Technology.
8. Thomssen E.G. Modern Cosmetics, Universal Publishing Corporation.
9. Mittal B.M. & Saha R.N.-a handbook of cosmetics, Vallabh Prakashan.
10. Harry G.Brittain, "Polymorphin in Pharmaceuticals Solids".

BPH 153 Pharmacognosy-III

Unit-I

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

Glycosides :

1. **Saponins** : Liquorice, Ginseng, Dioscorea, Coleus species.
2. **Cardioactive sterols** : Digitalis, Squill, Stropanthus & Thevetia
3. **Anthraquinone Cathartics** : Aloe, Senna, Rhubarb & Cascara.

Unit-II

Others :

Psoralea, Ammi majus, Ammi visnaga, Gentian, Saffron, Chirata, Quassia and Andrographis paniculata.

(B) Production and Utilization of phytoconstituents such as calcium sennsoides, Diosgenin, Solasodine & Podophyllotoxins

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, Tylophora, Bhilwa, Kalijiri, Vach, Rasna.

Unit-IV

Punarnava, Chitrak, Apamarg, Gokhru, Shankpushpi, Brahmi, Methi, Lehsun, Palash, Guggul, Gymnema, Shilajit, Tulsi, Nagarmotha, Majith, Malkanguni and Neem.

Unit-V

Brief Introduction and principles of Ayurvedic, Unani , Siddha and Homeopathic systems of medicines. Introduction to Herbal Pharmacopoeia with special reference to Arishtas, Asavas, Gutikas, Tailas, Churnas, Lehyas and Bhasmas.

BPHP 153-PRACTICAL

1. Identification of crude drugs listed in theory
2. Microscopic study of some important glycoside containing drugs as outlined above, Study of powdered drugs.
3. Standardization of some traditional drug formulations.

SUGGESTED PRACTICALS

1. Morphology and microscopy (powder) of Liquorice along with its chemical tests.
2. Morphology of Aloe and chemical tests on Aloe-extracts.
3. Morphology and microscopy (powder) of Rhubarb
4. Morphology of Psoralea, Ammimaius, Saffron and Chirata.
5. Morphology of Amla, Kantkari, Shatavari and Vach.
6. Morphology of Punarnava, Apamarg, Gokhru, and Shankhpushpi.
7. Morphology of Brahmi, Methi, Lehsun and Palash.
8. a) Morphology of Nagarmotha and Neem. b) Identification Tests for Guggul lipids.
9. To study the following standards) Loss on drying. b) Extractive values.
- c) Ash values. d) pH of 1% solution, in water and alcohol of any Ayurvedic formulation (solid) available in the market. 10. To perform above studies (exp. 10) in any liquid Ayurvedic formulation. 11. Preparation of medicated oil.

PROJECT WORK A report on marketed preparations based on traditional drugs mentioned in theory.

Books Recommended

1. Kokate C.K. "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
2. Wallis T.E. "Analytical Microscopy" J&A Churchill Ltd., London.
3. Trease, G.E., & Evans, W.C., Evans, W.C., "Pharmacognosy" Bailliere Tindall east Baorne, U.K.
4. Tyler V.E. et al : "Pharmacognosy" Lea & Febiger, Philadelphia.
5. Wallis. T.E. "Text Book of Pharmacognosy" J&A Churchill Ltd. London.
6. Qadry J.S., "Pharmacognosy" B.S.Shah Prakashan.
7. Medicinal plants of India I&II, Indian council of Medical Reasearch, New Delhi.
8. Nadkarni A.K. Indian Materia Medica 1-2, Popular Prakashan (P) Ltd. Bombay.
9. Atal C.K. & Kapur BM. "Cultivation & utilization of Medicinal plants, RRL, Jammu. 10. Indian Herbal Pharmacopoeia, vol. I&II, ICMR & RRL, Jammu.
11. The wealth of India, Raw Materials (All volumes) Council of Scientific & Industrial Research, New Delhi.
12. Compendium of Indian Medicinal Plants I-IV, Rastogi & Malhotra.
13. Indian Ayurvedic Pharmacopoeia, Govt. of India.
14. Kokate CK, Gokhale AS, Gokhale SB, Cultivation of Medicinal Plants, Nirali Prakashan.
15. Mohammed Ali," Pharmacognosy & Plant Cultivation" 17. Indian Pharmacopoeia.

BPH 154 Pharmaceutical Chemistry-V (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.

Mode of action, uses, structure activity relationship of the following classes of drugs (Synthetic procedures of individually mentioned drugs only)

Unit-II

Drugs acting at Synaptic and neuro-effector junction sites:

Cholinergic, Anticholinergic & Anticholinesterases-Neostigmine, Physostigmine, Methacholine, Pilocarpine, Atropine. Adrenergic Drugs-Ephedrine, Amphetamine, Salbutamol, Adrenaline.[08]

Unit-III

Drugs acting on the Central Nervous System :

General Anaesthetics-Thiopental, Ketamine, Methohexital.

Local Anaesthetics-Lignocaine, Benzocaine. Sedatives and Hypnotics-Phenobarbitone, Alprazolam. Opioid Analgesics-Pethidine, Methadone, Pentazocine.

Unit-IV

Antitussives-Cramiphen, Dextromethorphen.

Anticonvulsants-Phenytoin, Carbamazepine, Ethosuximide, Valproic Acid. Antiparkinsonism drugs-Carbidopa, Levodopa. CNS Stimulants-Caffeine, Nikethamide.

Unit-V

Psychopharmacological Agents :

Antianxiety drugs- Diazepam, chlordiaze Poxide. Antidepressants – Imipramine, Amitriptyline Fluoxetine. Antispasmodic and Antiulcer drugs-Dicyclomine, Ranitidine, Omeprazole. Skeletal muscle Relaxants– Gallamine Mephenesin, Antipsychotic- Chlorpromazine, Haloperidol.

BPHP 154-PRACTICAL

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

SUGGESTED PRACTICALS

1. Synthesis of Methyl salicylate.
2. To establish pharmacopoeial standards of Methyl salicylate.
3. Synthesis of Paracetamol.
4. To establish pharmacopoeial standards of Paracetamol.
5. To synthesize Benzocaine.
6. To establish pharmacopoeial standards of Benzocaine.
7. Synthesis of Phenytoin.
8. To establish pharmacopoeial standards of Phenytoin.
9. Synthesis of Barbituric acid derivatives. 10. To establish pharmacopoeial standards.

Books Recommended

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/Longman, London.
2. 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.
3. Pharmacopoeia of India, Minsitry of Health, Govt. of India.
4. Wolff ME. Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
5. 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.
6. Foye W C. Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
7. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L. Organic Chemistry, Vol I & II, ELBS/ Longman, London.
10. Lednicer, D. The Organic Chemistry of Drug Synthesis Vol. I-V, John Wiley & Sons Inc. New York.

BPH 155 Pharmacology-I

Unit-I

General Pharmacology – Introduction to pharmacology, routes of drug administration, combined effect of drugs, factors modifying drug action.

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,. Adverse drug reactions & treatment of poisoning. drug interactions,

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

Unit-IV

Pharmacology of CNS

General Anaesthetics, Alcohols & disulfiram, Sedative hypnotics, Psychopharmacological agents-anti anxiety agents ,antipsychotics, antidepressants. Antiepileptic drugs, Antiparkinsonism drugs, Analgesics & antagonists.

Unit-V

Drugs acting on PNS

Local anesthetics

Skeletal muscle Relaxants Peripherally and Centrally acting muscle Relaxants

BPHP 155-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. Barar F.S.K: Text Book of Pharmacology, Interprint, New Delhi.
3. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International.
4. Laurene, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone.
5. Rang MP, Dale MM, Riter JM, Pharmacology Churchill Livingstone.
6. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
7. Satoskar & Bhandarkar : Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay.
8. Paul. L., Principles of Pharmacology, Chapman and Hall.
9. Singh, Surender; Essentials of Pharmacology, Academia Publishers, Delhi.
10. Sheffield Bioscience Programs, U.K., ISBN. 1-874758-02-6.
11. Dipiro, Joseph L.; Pharmacotherapy: A Pathophysiological Approach, Elsevier,2005.
12. Herfindal, E.T. and Hirschman, J L.; Clinical Pharmacy and Therapeutics. Relevant Reviews Articles from Medical and Pharmaceutical Literature.

SYLLABUS

Course : B. Pharm. Effective From Session : 2012-2013 Year-III, Semester-VI

BPH 161 Pharmaceutical Chem.-VI (Medicinal Chemistry-II)

Unit-I

Drug Design

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

Unit- II

Cardiac glycosides & drug used for CHF-Digitoxin Antiarrhythmic drugs-Propranolol, Procainamide Antianginal drugs- Isosorbide mononitrate Antihypertensive drugs-Captopril, methyldopa, Nifedipine.

Anticoagulants- Heparin, warfarin Antihyperlipidemics- Lovastatin, Clofibrate

Unit-III

Anti cancer drugs

Alkylating Agents- Chlorambucid, Carmustine

Antimetabolites- Methotaxate

mercaptopurine

Fluorouracil .

Unit-IV

Analgesics and Antipyretics – Aspirin, Mefenamic Acid, Ibuprofen, Diclofenac, Paracetamol.

Antibacterials – Sulphamethoxazole, Sulphadiazine, Sulphacetamide, Nalidixic acid. [08]

Unit-V

Diuretics – Acetazolamide, Chlorthiazide; Furosemide, Spironolactone.

BPHP 161-PRACTICAL

1. Synthesis of selected drugs from the course content involving two or more steps.
2. Establishing the pharmacopoeial standards of the drugs synthesized.
3. Spectral analysis of the drugs synthesized.

Books Recommended

1. Mann P G & Saunders B C, Practical Organic Chemistry, ELBS/ Longman, London.
2. 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.
3. Pharmacopoeia of India, Ministry of Health, Govt. of India.
4. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
5. 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.
6. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.

7. Singh Harkishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
8. Nogrady, T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
9. Finar I L, Organic Chemistry, Vol I & II, ELBS/ Longman, London.
10. Thomas J..Perun, ” Computer –aided Drug Design methods applications’.
11. Pandi Veerapandian, ” Structure-Based Drug Design”.

BPH 162 Pharmacology-II

Unit-I

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

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.

Unit-III

NSAIDS .Drugs used in gout and arthritis .Diuretics and antidiuretics

Unit-IV

Autocoids: Histamine, 5HT and their antagonists, Prostaglandins, Thromboxane, Leukotrienes, Angiotensin and Bradykinin

Unit-V

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

BPHP 162-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. Barar F.S.K: Text Book of Pharmacology, Interprint, New Delhi.
3. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International.
4. Laurene, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone.
5. Rang MP, Dale MM, Riter JM, Pharmacology Churchill Livingstone.
6. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.

7. Satoskar & Bhandarkar : Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay.
8. Paul. L., Principles of Pharmacology, Chapman and Hall.
9. Singh, Surender; Essentials of Pharmacology, Academia Publishers, Delhi.
10. Sheffield Bioscience Programs, U.K., ISBN. 1-874758-02-6.
11. Dipiro, Joseph L.; Pharmacotherapy: A Pathophysiological Approach, Elsevier, 2005.
12. Herfindal, E.T. and Hirschman, J L.; Clinical Pharmacy and Therapeutics.

BPH 163 Pharmacognosy-IV

Unit-1 : 1. Systematic study of source, cultivation, collection, processing, commercial varieties, chemical constituents, substitutes adulterants, uses, diagnostic macroscopic & microscopic features & specific chemical tests of following alkaloid containing drugs.

(A) Pyridine-piperidine : Tobacco, Areca & Lobelia.

(B) Tropane : Belladonna, Hyoscyamus, Datura, Coca & Withania.

(C) Quinoline & Isoquinoline : Cinchona, Ipecac & Opium..

(D) Indole : Ergot, Rauwolfia, Catharanthus & Nux-vomica.

Unit-II : (E) Imidazole : Pilocarpus. **(F) Steroidal :** Veratrum & Kurchi. **(G) Alkaloidal amine :** Ephedra & Colchicum. **(H) Glycoalkaloid :** Solanum. **(I) Purines :** Coffee & Tea

Unit-II : (E) Imidazole : Pilocarpus. **(F) Steroidal :** Veratrum & Kurchi. **(G) Alkaloidal amine :** Ephedra & Colchicum. **(H) Glycoalkaloid :** Solanum. **(I) Purines :** Coffee & Tea **(J) Quinazoline :** Vasaka. Utilization & production of phytoconstituents such as – Tropane Alkaloids, Isoquinoline & Quinoline Alkaloids.

Unit-III :

(A) World wide trade in Medicinal plants & derived product.

Tropane alkaloids containing drugs, Cinchona, Ipecac, Rauwolfia, Taxol. Diosgenin, Digitalis, Liquorice, Papain, Ginseng, Aloe, Valerian, & plant laxatives.

(B) Role of Medicinal & aromatic plants in National Economy.

Unit-IV :

Biological sources, preparation, Identification tests and uses of following enzymes – Diastase, papain, Penicillinase, Hyalluronidase, Streptokinase. Plant Bitters & Sweeteners.

Unit-V :

Introduction, classification & study of different chromatographic methods. Application of chromatographic techniques in evaluation of herbal drugs. Historical development of plant tissue culture, type of culture, Nutritional requirement, growth & their maintenance. Application of plant tissue culture in pharmacognosy.

BPHP 163-PRACTICAL

1. Identification of crude drugs listed above.
2. Microscopic study of characters of any 8 selected drugs given in theory in entire and powder form.
3. Chemical evaluation of powdered drugs & Enzymes.
4. Chromatographic studies of some herbal constituents.
5. Some experiments in plant tissue culture.

SUGGESTED PRACTICALS

1. To study the morphology and microscopy of Datura and Withania.
2. To study the morphology and microscopy of Ipecac and Rauwolfia.
3. To study the morphology and microscopy of Catharanthus and Nux-vomica.
4. To study the morphology and microscopy of Ephedra and Kurchi.
5. To study the morphology and microscopy of Solanum and Vasaka.
6. a) Morphology of Areca, Colchicum. b) Transverse section of Catharanthus leaf and Kurchi bark.
7. To study the TLC profile of Catharanthus leaf.
8. To study the TLC profile of Withania root.
9. Chemical test of Tea, Tobacco, Datura and Withania.
10. Chemical test of Nux-vomica, Ephedra, and Kurchi.
11. Introduction of plant-tissue culture techniques on laboratory scale.

Books Recommended

1. Brain, K.R., & Turner T.D, The Practical evaluation of phytopharmaceutical, Wright, Bristol.
2. Sim, Medicinal Plant Alkaloids & Glycosides.
3. Kokate C.K., "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
4. Stahl E. "Thin layer chromatography" A Laboratory Hand Book, Springer Verlag, Berlin.
5. Harborne, J.B. Phytochemical Methods Chapman & Hall, International Ed, London.
6. Pharmacopoeia of India.
7. I.L. Finar "Organic chemistry" Vol. I & II ELBS, London.
8. O.P. Agarwal, "Chemistry of Organic Natural Product" Vol. I & II Goel Pub. House, Meerut.
9. Trease G.E. & Evan, W.C., "Pharmacognosy" Bailleire tindall East bourne, U.K.
10. Tyler V.E. etal "Pharmacognosy" Lea & Febiger Philadelphia.
11. Qadry, J.S.," Pharmaconosy "B.S.Shah Prakashan.
12. Pridham JB & Swain T. Biosynthetic pathway Higher plants, Academic Press, New York.
13. Sharma PP, Cosmetics formulation, Manufacturing & Quality control, 3 Ed., Vandana Publishers, Delhi.
- Rd
14. Abraham DJ, Berger's Medicinal Chemistry & Drug Discibery, John Wiley & Sons, New Jersey.
15. Mohammed Ali," Pharmacognosy & Plant Cultivation".
16. Indian Pharmacopoeia.

BPH 164 Pharmaceutics –VIII (Biopharmaceutics & Pharmacokinetics)

Unit-I

Introduction to Biopharmaceutics and Pharmacokinetics and their role in formulation development and clinical setting.

Biopharmaceutics:

- (A) Passage of drugs across biological barrier (passive diffusion, active transport, facilitated diffusion and pinocytosis).
- (B) Factors influencing absorption – Physicochemical, physiological and pharmaceutical.
- (C) Drug distribution in the body, plasma protein binding.

Unit-II

Pharmacokinetics:

- (A) Significance of plasma drug concentration measurement.
- (B) Compartment model and Non-compartment model. Definition and Scope
- (C) Pharmacokinetics of drug absorption – zero order and first order absorption rate constant using Residual Method, Wagner – Nelson, Loo-Reigelman method.

Unit-III

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

Unit-IV

- (A) Dosage adjustment in patients with and without renal and hepatic failure.
- (B) Pharmacokinetic drug interactions and their significance in combination therapy.

Unit-V

Bioavailability and Bioequivalence:

- (A) Measures of bioavailability, C-max, and area under the curve (AUC), Design of single dose bioequivalence study & relevant statistics, Biopharmaceutical Classification System
- (B) Review of regulatory requirements for conduction of bioequivalent studies.

BPHP 164-Practicals based on theory syllabus.

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. Wagner J.G. Pharmacokinetics for the Pharmaceutical Scientist, Technomic Publishing A.G. Basel, Switzerland.

BPH 165 Pharmaceutics-IX (Community and Hospital Pharmacy)

Unit -I

Introduction to Community Pharmacy:

Organization and structure of retail and whole sale drug store-types of drug store and design, legal requirements for establishment, maintenance and drug store-dispensing of proprietary products, maintenance of records of retail and wholesale, patient counseling, role of pharmacist in community health care and education (First aid, communicable diseases, nutrition, family planning).

Unit -II

Organization and Structure of hospital pharmacy:

Organization of a hospital and hospital pharmacy, Responsibilities of a hospital pharmacist, Pharmacy and therapeutic committee, Budget preparation and Implementation.

Hospital Formulary:

Contents, preparation and revision of hospital formulary.

Unit -III

Drug Information Services: Sources' of Information on drugs, disease, treatment schedules, procurement of information, Computerized services (e.g., MEDLINE), Retrieval of information, Medication error- types of medication errors, correction and reporting.

Records and Reports: Patient medication profile, cases on drug interaction and adverse reactions, idiosyncratic cases. Pharmacoeconomics: Introduction to pharmacoeconomics, different methods of pharmacoeconomics, application of pharmacoeconomics. Pharmacoepidemiology: Definition and scope, method to conduct pharmacoepidemiological studies, advantages & disadvantages of pharmacoepidemiological studies.

Unit -IV

Drug distribution Systems in Hospitals:

Out-patient dispensing, methods adopted; Dispensing of drugs to in-patients. Types of drug distribution systems. Charging policy, labeling; Dispensing of drugs to ambulatory patients; Dispensing of controlled drugs, Dispensing of ancillary supplies.

Unit -V

Manufacture of Sterile and Non-sterile Products:

Policy making of manufacturable items, demand and costing, personnel requirements, manufacturing practice, Master formula Card, production control, Manufacturing records.

Blood Products and Plasma Substitutes:

Collection, processing and storage of whole human blood, concentrated human RBCs, dried human plasma, human fibrinogen, human thrombin, human normal immunoglobulin, human fibrin, foam plasma substitutes, -ideal requirements, PVP, dextran etc. for control of blood pressure as per I.P.

BPHP 165-Practicals based on theory syllabus.

SYLLABUS

Course : B. Pharm.

Effective From Session : 2012-2013 Year-IV, Semester-VII

BPH 171 Pharmaceutical Analysis III

Unit-I

Colorimetric Method- Chemistry, Instrumentation and applications

Ultra violet and Visible- Electronic excitation, Spectrophotometry, quantitative laws, deviation from Beer's law, instrumentation, single and double beam spectrophotometry, Woodward-Fieser rules.

Unit-II

Infra-Red spectrophotometry-Theory, instrumentations, Interpretation of IR , spectra of simple compounds, FTIR, applications in pharmaceutical analysis.

Fluorimetric Analysis- Theory, Instrumentation and applications.

Unit-III

NMR Spectroscopy- Theory of ^1H .NMR, chemical shift, Shielding & Deshielding, spin spin coupling, spin spin splitting spectra of $\text{CH}_3\text{-CH}_2\text{-OH}$, $\text{CH}_3\text{-CHO}$, $\text{CH}_3\text{-(CH}_2\text{)}_4\text{ CH}_3$, C_6H_6 , $\text{CH}_3\text{C}_6\text{H}_5$

Unit-IV

Mass Spectroscopy –Theory, Instrumentation & Applications, mass spectra of some simple compounds $\text{CH}_3\text{-CH}_2\text{-OH}$, $\text{CH}_3\text{-CHO}$, $\text{CH}_3\text{-(CH}_2\text{)}_4\text{ CH}_3$, C_6H_6 , $\text{CH}_3\text{C}_6\text{H}_5$ Flame photometry- Theory, instrumentation and applications. Atomic absorption spectroscopy, instrumentation and applications

Unit-V

Introduction to X-Ray diffraction technique

Basic Principles. Instrumentation and application of GLC, HPLC & HPTLC

BPHP 171-PRACTICAL

1. Assay of at least 10 official formulation containing single and more active ingredients using instrumental techniques.

2. Interpretation of a few spectra.

BOOKS RECOMMENDED

1. Pharmacopoeia of India, Ministry of Health, Govt of India.

2. Becket A.H. and Stenlake J.B. Practical Pharmaceutical Chemistry Vol. I and II, The Athlone Press of the University of London.

3. Chatten L.G. A text book of Pharmaceutical Chemistry Vol. I & II Marcel, Dekker, New York.

4. Willard H.H. and Merrit L. Jr and Dean J.A., Instrumental methods of analysis Van Nostrand Reinhold, New York.
5. Obonson J.W.R. Undergraduate Instrumental Analysis, Marcel Dekker Inc, New York, 1970.
6. Parikh V.H. Absorption Spectroscopy of Organic Molecules Addison-Wesley Publishing Co., London 1974.
7. Silver stein RM & Webster FX, Spectrometric Identification of Organic Compounds, John Wiley & Sons.
8. Skoog V, Principles of Instrumental Analysis, Holler-Neimen

BPH 172 Pharmaceutics-X (Pharmaceutical Technology-II)

Unit-I

1. Capsules: Advantages and disadvantages of capsule dosage form, material for production of hard gelatin capsule, size of capsules, methods of capsule filling, soft gelatin capsule shell and capsule content, importance of base adsorption and minim/gm factors in soft capsule, quality control, stability testing and storage of capsule dosage forms.

2. Micro-encapsulation : Types of microcapsule, importance of microencapsulation in pharmacy, microencapsulation by phase co-precipitation separation, multi orifice, spray drying, spray congealing, polymerisation, complex, formulation, emulsion, air suspension technique, coating pan and other techniques, evaluation of micro capsules.

Unit-II

Tablets :

(A) Advantages and disadvantages of tablets, Formulation of different types of tablets, granulation technology on large-scale by various techniques, physics of tablets making, different types of tablet compression machinery and the equipments employed, evaluation of tablets.

(B) Coating of Tablets : Types of coating, film forming materials, formulation of coating solution, equipments for coating process, evaluation of coated tablet. Stability kinetics and quality assurance.

Unit-III

(A) Approaches to Sustained and controlled release dosage forms. In-vitro methods of evaluation.

(B) Formulation, method of preparation, labeling, container and evaluation of Ophthalmic, Nasal and Ear products.

Unit-IV

Parenteral Products :

Preformulation factors, routes of administration, water for injection, sterile water for injection pyrogenicity, nonaqueous vehicles. Formulation details, containers and closures and their selection and labelling. Isotonicity and methods of its adjustment.

Prefilling treatment, washing of containers and closures, preparation of solution and suspensions, filling and sealing of ampoules, vial, infusion fluids, lyophilization & preparation of sterile

powders, Aseptic techniques, source of contamination and methods of prevention, Design of Aseptic area, equipment for large scale manufacture and evaluation of parenteral products.

Unit-V :

Surgical Products : Definition, primary wound dressing, absorbents, surgical cotton, surgical gauzes etc, bandages, adhesive type, protective cellulosic hemostasis, official dressings, absorbable and non absorbable sutures, ligatures and catguts.

Packaging of Pharmaceutical Products : Packaging component types, specifications and methods of evaluation, stability aspects of packaging equipments, factors influencing choice of containers, legal and other official requirements for containers, package testing.

BPH 172-Practicals based on theory syllabus.

BOOKS RECOMMENDED

1. Remington: The Science and Practice of Pharmacy Pharmaceutical Sciences Vol. I & III, Mack Publishing Company, U.S.A.
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, Lea & Febiger, Philadelphia, U.S.A.
4. R.C. Juliano, Drug Delivery Systems, Oxford University Press, Oxford.
5. Herbert A. Liebermann & Leon Lachman, Theory & Practice of Industrial Pharmacy, Lea & Febiger, Philadelphia, U.S.A.
6. Manohar A.Potdar, ' C,GMP for Pharmaceuticals'.

BPH 173 Pharmacology-III

Unit-I

Pharmacology of Endocrine System

Hypothalamic & pituitary hormones, Thyroid hormones & Thyroid Drugs, Parathormone, Calcitonin & Vitamin D, Insulin, oral hypoglycemic agents & glucagon.

Unit-II

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

Unit-III

Chemotherapy

General Principles of Chemotherapy, Sulfonamides, Cotrimoxazole, Quinolones, Antibiotics – Penicillins, Cephalosporins, Chloramphenicol, Tetracyclines, Macrolides.

Unit-IV

Chemotherapy of Parasitic infections, Tuberculosis, Leprosy, Malaria, Fungal infections, Viral diseases, Introduction to Immunomodulators and Chemotherapy of Cancer.

Unit-V

Bioassay of drugs & Biological standardization. Discovery & development of new drugs.

Principles of Toxicology

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

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. Barar F.S.K: Text Book of Pharmacology, Interprint, New Delhi.
3. Katzung, B.G. Basic & Clinical Pharmacology, Prentice Hall, International.
4. Laurene, DR & Bennet PN; Clinical Pharmacology, Churchill Livingstone.
5. Rang MP, Dale MM, Riter JM, Pharmacology Churchill Livingstone.
6. Tripathi, K.D. Essentials of Medical Pharmacology, Jay Pee Publishers, New Delhi.
7. Satoskar & Bhandarkar : Pharmacology & Pharmacotherapeutics, Popular Prakashan Pvt. Ltd., Bombay.
8. Paul. L., Principles of Pharmacology, Chapman and Hall.
9. Singh, Surrender; Essentials of Pharmacology, Academia Publishers, Delhi.
10. Sheffield Bioscience Programs, U.K., ISBN. 1-874758-02-6.
11. Dipiro, Joseph L.; Pharmacotherapy: A Pathophysiological Approach, Elsevier,2005.
12. Herfindal, E.T. and Hirschman, J L.; Clinical Pharmacy and Therapeutics.
13. Relevant Reviews Articles from Medical and Pharmaceutical Literature.

BPHP 173-PRACTICAL

1. To calculate the pA₂ value of Atropine & chlorpheniramine.
2. Bioassay of Ach, histamine & oxytocin on suitable isolated preparations using matching assay, bracketing assay, three point assay & four point assay.
3. Bioassay of histamine and acetylcholine using matching and interpolation method on rat guinea pig . All experiments will be conducted using software wherever possible.

Books Recommended:

1. Ghosh, MN; Fundamentals of Experimental Pharmacology, Scientific Book Agency, Calcutta.
2. Grover J.K., Experiments in Pharmacy & Pharmacology, CBS Publishers, New Delhi.
3. Kulkarni S.K., Hand Book of Experimental Pharmacology, Vallabh Prakashan, Delhi.

4. H.G. Vogel (ed), Drug Discovery and Evaluation-Pharmacological Assays, 2nd edition, Springer Verlag, Berlin, Germany, 2002.
5. M.N. Ghosh, Fundamentals of Experimental Pharmacology, 2nd edition, Scientific Book Agency, Calcutta, India, 1984.
6. D.R. Laurence and A.L. Bacharach (eds), Evaluation of Drug Activities: Pharmacometrics, Vol. 1 and 2, Academic Press, London, U.K., 1964.
7. Indian Pharmacopoeia, Govt of India press 2009.
8. Robert A. Turner, Screening methods in Pharmacology, 1971, Academic Press, New York.
9. Laurence and Bachrach, Evaluation of drugs activities. 1971, Academic Press, New York.

BPH 174 Pharmaceutical Chemistry-VII (Medicinal Chemistry-III)

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

Unit-I

1. Steroids and related drugs : Introduction, Classification, Nomenclature, Stereochemistry

(A) Androgens and Anabolic steroids – Testosterone, Stanozolol.

(B) Estrogens and Progestogens – Progesterone, Estradiol.

(C) Adrenocorticoids – Prednisolone, Dexamethasone, Betamethasone.

Unit-II

Antibiotics- Penicillin, Semi-synthetic penicillins, streptomycin, tetracyclines, Cephalosporins, Chloramphenicol, Fluroquinolones.

Antimycobacterial Agents: PAS, Ethambutol, Isoniazid, Dapsone

Unit-III

Antimalarials: Chloroquine, Primaquine, Pyrimethamine.

Antiamoebics: Metronidazole, Tinidazole, Diloxanide

Antiseptics & Disinfectants – Benzalkonium chloride

Anthelmintics- Mebendazole

Antifungals :- Griseoflavin and Clotrimazole

Unit-IV

Anti- HIV agents- Zidovudine, Zalcitabine, Saquinavir.

Antivirals – Amantadine, Acyclovir, Lamivudine. Prostaglandins – Misoprostol, Carboprost.

Unit-V

Thyroid and Antithyroids – Carbimazole, Levothyroxine, Propylthiouracil,

Methimazole. Hypoglycaemics - Insulin Chlorpropamide, Metformin,

Tolbutamide, Glibenclamide.

BPHP 174- Practicals based on theory syllabus

Books Recommended

1. Pharmacopoeia of India, Ministry of Health, Govt. of India.
2. Wolff ME, Ed. Burger's Medicinal Chemistry, John Wiley & Sons, New York.
3. Delagado J N and Remers W A R, Eds., Wilson And Gisworld's Text book of Organic Medicinal and Pharmaceutical Chemistry, J. Lippincott Co., Philadelphia.
4. Foye W C, Principles of Medicinal Chemistry, Lea & Febiger, Philadelphia.
5. Singh Harkrishan and Kapoor, V.K., Organic Pharmaceutical Chemistry, Vallabh Prakashan, Delhi.
6. Nogrady T, Medicinal Chemistry – A Biochemical Approach, Oxford University Press, New York, Oxford.
7. Finar I L, Organic Chemistry, Vol. I & II, ELBS/ Longman, London.
8. Hanch C, Comprehensive Medicinal Chemistry, Vol. IV, Quantitative Drug Design, Pergamon Press, Oxford.

BPH 175 Elective-I

(A) PHARMACEUTICAL SALES & MARKETING-I

Unit I

Basic Concept of Marketing, Principles of Marketing Management.

Unit II

Concept of Potential, Identification of the potential Physician & market

Unit III

Drug Development , Diversification & Specialization

Unit IV

Economic & Competitive aspect of Pharm. Industry, Advertising & Detailing

Unit V

Distribution channels in Pharm industry, Selection of distributors/stockists

BPHP 175-Practical based on theory syllabus.

(B) NOVEL DRUG DELIVERY SYSTEM-I

Unit-I

1. Theory of controlled release drug delivery systems.
2. Release and diffusion of drugs from C.D.D.S., General methods of design and evaluation of C.D.D.S.

Unit-II

Design and Fabrication of Technology Based CR Systems:

Polymers in drug delivery: Polymer classifications, biodegradable and nonbiodegradable polymers, water-soluble polymers, and their applications in controlled release, biocompatibility testing.

Oral controlled release delivery systems: Strategies and design of oral controlled release delivery systems, oral systems based on dissolution, diffusion and dissolution, ion-exchange resins, pH independent formulations, altered density formulations. Buccoadhesive/ mucoadhesive system. Osmotic controlled oral drug delivery, fast release-introduction, formulation, evaluation and patented technologies.

Unit-III

Parenteral systems, biopharmaceutical considerations, design and development.

Implantable therapeutic system, biocompatibility of polymers and carriers, Intrauterine devices and intervaginal devices.

Unit-IV

Transdermal drug delivery systems: Theory, formulation and evaluation, iontophoresis

Osmotic pumps.

Unit-V

Buccal, nasal, ocular drug delivery systems

BPHP 175-Practicals based on theory syllabus.

Books Recommended

1. Chien YW., 'Novel Drug Delivery Systems- Fundamentals, Developmental concepts, Biomedical Assessment', Marcel Dekker, New York.
2. Chien YW., ed., 'Transdermal Controlled Systemic Medications ' Marcel Dekker, New York.
3. Banker GS & Rhodes C.T. , 'Modern Pharmaceutics', Marcel Dekker, New York.
4. Gennaro A.R., 'Remington, The Science & Practice of Pharmacy,' Lippincott. Williams & Wilkins.
5. Lachman L, Lieberman B.A & Kanig IL.' The Theory & Practice of Industrial Pharmacy, Varghese Publishing House.
6. Aulton M.E., 'Pharmaceutics-The Science of Dosage form Design' Churchill Livingstone.
7. Mathiowitz, E. et al ' Bioadhesive Drug Delivery Systems: Fundamentals, Novel Approaches, and Development', Marcel Dekker, New York.
8. Bronaugh RL & Maibach H.I. ' Percutaneous Absorption Drugs-Cosmetics-Mechanism-Methodology', Marcel Dekker, New York.
9. Potts R.O. & Guy R.H., ' Mechanism of Transdermal Drug Delivery', Marcel Dekker, New York.
10. Rathbone MJ,' Oral Mucosal Drug Delivery ' Marcel Dekker, New York.

(C) HERBAL DRUG TECHNOLOGY-I

Elective-I

Unit I

Role of medicinal plants in folk/tribal/home remedy

Unit II

Development of monograph of a medicinal plant

Unit III

Recent techniques involved in extraction

Unit IV

Column Chromatography

Unit V

Software concepts like Sigma stat and Endnote.

BPHP 175-Practical based on theory syllabus.

(D) DRUG DESIGN-I

Unit-I

Introduction to Drug Design, Lead Discovery, Interactions (Forces) involved in drug receptor complex. Physiochemical properties in relation to biological action, Stereochemical aspects in drug design, Bioisosterism

Unit-II

Drug Development: Dissection of a drug molecule into biofunctional moieties. Identification of Pharmacophore. Structural modifications: homologation, chain branching and ring chain transformations. Bioisosterism. Modulation of pharmacokinetics by molecular manipulations

Unit-III

Drug metabolism-Phase I & Phase II Metabolic Reactions, Prodrugs & Soft drug concepts

Unit-IV

Analogues based drug design concept with suitable examples, Designing of analogues.

Unit V

Structure Based drug design-concept of structure based drug design with examples.

BPHP 175-Practical based on theory syllabus.

(E) DRUG REGULATORY AFFAIRS-I

Unit I

Introduction about drug regulation and regulatory authorities like CDSCO, USFDA, EMEA, MHRA, WHO, ICH & ISO.

New Drug development and its approval process (IND, NDA & ANDA).

Unit II

IPR, Patents, Trademark, copyright acts.

Unit III

Requirement of GMP with special references to schedule-M.

Unit IV

Concept of T Q M, Quality assurance and quality control.

In process quality control tests & IPQC problems in pharmaceutical industry.

Unit V

Documentation & Maintenance of records: BMR, Tables, Master formulae, Batch Packaging records, concept of SOP and its content.

BPHP 175-Practical based on theory syllabus

SYLLABUS

Course : B. Pharm.

Effective From Session : 2012-2013 Year-IV, Semester-VIII

BPH 181 Natural Products

Unit-I

Chemical & Spectral approaches to simple molecules of natural origin.

Biogenetic Investigations and basic metabolic pathways, (alkaloids, terpenes, steroids) Brief introduction to biogenesis of secondary metabolites of Pharmaceutical importance.

Unit-II

Extraction, Isolation & Chemistry of –

i) **Glycosides** - Digitoxin, Digoxin, Hecogenin, Diosgenin & Sarasapogenin

ii) **Lignans** iii) **Quassinoids** iv) **Flavonoids (Quercetin)**

Unit-III

Alkaloids – Atropine & related compounds, quinine, reserpine, morphine, papaverine, ephedrine, ergot, and Vinca Alkaloids. Natural Allergens, Photosensitizing agents and fungal toxins.

Unit-IV

Extraction, Isolation & Characterisation of – Terpenoids- Camphor, Menthol, Citral, β - Carotene, α -Tocopherol, α -Pinene.

Unit-V

Herbal Cosmetics and their formulation.

Recent developments of natural products used as anticancer agents, antidiabetics and immunomodulators.

BPHP 181-PRACTICAL

1. Laboratory experiments on Isolation, separation, purification of various groups of chemical Constituents of Pharmaceutical significance.
2. Exercises on paper & thin layer chromatographic evaluations of herbal drug constituents.
3. Extraction of volatile oils & theirs chromatographic profiles.

BOOKS RECOMMENDED

1. Brain, K.R., & Turner T.D, The Practical evaluation of phytopharmaceutical, Wright, Bristol.
2. Sim, Medicinal Plant Alkaloids & Glycosides.
3. Kokate C.K., "Practical Pharmacognosy" Vallabh Prakashan, New Delhi.
4. Stahl E. "Thin layer chromatography" A Laboratory Hand Book, Springer Verlag, Berlin.
5. Harborne, J.B. Phytochemical Methods Chapman & Hall, International Ed, London.
6. Pharmacopoeia of India.
7. I.L. Finar "Organic chemistry" Vol. I & II ELBS, London.
8. O.P. Agarwal, "Chemistry of Organic Natural Product" Vol. I & II Goel Pub. House, Meerut.

9. Trease G.E. & Evan, W.C., "Pharmacognosy" Bailleire tindall East bourne, U.K.
10. Tyler V.E. etal "Pharmacognosy" Lea & Febiger Philadelphia.
11. Qadry, J.S.," Pharmaconosy "B.S.Shah Prakashan.

BPH 182 Pharmaceutics-XI (Pharmaceutical Industrial Management)

Unit-I

Concept of Management : Administrative Management (Planning, Organising Staffing Directing and Controlling). Entrepreneurship development, Operative Management (Personnel, Materials, Production, Financial, Marketing, Time/space, Margin/ Morale) Principles of Management (Coordination, Communication, Motivation, Decision making, leadership, Innovation Creativity, Delegation of Authority / Responsibility. Record Keeping), Identification of key points to give maximum thrust for development and perfection.

Unit-II

Pharmaceutical Marketing : Functions, buying, selling, transportation, storage financed feedback information, channels of distribution, wholesale, retail, department store, multiple shop and mail order business.

Salesmanship : Principle of sales promotion, advertising, ethics of sales, merchandising, literature, detailing, Recruitment, training, evaluation , compensation to the pharmacist.

Unit-III

Market Research

(A) Measuring & Forecasting Market Demand - Major concept in demand measurement, Estimating current demand Geo-demo-graphic analysis. Estimating industry sales, Market share and future demand.

(B) Market segmentation & Market targeting.

Unit-IV

Materials Management : A brief exposure of basic principles of management major areas, scope, purchase, stores, inventory control and evaluation of materials management.

Production Management : A brief exposure of the different aspects of Production Management

– Visible and Invisible inputs, Methodology of Activities Performance Evaluation Technique Process –Flow, Process Know-how, Maintenance Management.

Unit-V

Economics : Principles of economics with special reference to the Laws of demand and supply, demand schedule, demand curves labor welfare, general principles of insurance and inland and foreign trade, procedure of exporting and importing goods.

Accountancy : Principles of Accountancy, Ledger posting and book entries preparation of trial balance, columns of a cash book, Bank reconciliation statement, rectification of errors, profits and loss account, balance sheet, purchase, keeping and pricing of stocks, treatment of cheques bills of exchange, promissory notes and bundles documentary bills.

BPHP 182- Project/assignment

Books recommended :

1. Beri, Market Research – Tata Mc Graw Hill
2. Chary S.N, Production and Operative Management / Tata Mc Graw Hill.
3. Datta A.K., Material Management / PHI.
4. Chadwick Leslie, The essence of management accounting / PHI.
5. Massie L. Joseph Essentials of Management / PHI.
6. Barthwal R.R, Industrial Economics –. / New Age International.
7. Shreenivasan K.R., An Introduction to Industrial Management –/ Vikas.
8. Daver Rustam S. Salesmanship and Publicity –/ Vikas.
9. Mukopadhyay Sekhar, Pharmaceutical Selling, Sterling Publishers.
10. Koontz H, Weihrich H, Essentials of Management, Tata Mc Graw Hill.
11. Vidya sagar Pharmaceutical Industrial Management, Pharma Book Syndicate
12. G.Vidya Sagar, ” Pharmaceutical Industrial Management”.

BPH 183 Environment and Ecology

Unit-I

Environment studies

A- Definition, scope & importance B- Natural Resources – renewable & non renewable C- Use, utilization, exploitation and associated problems of forests, Water resources, Mineral resources, Food resources, Energy resources, Land resources. D- Equitable use of resources for sustainable life style, role of an individual in conservation.

Unit-II

Ecosystems

A. Introduction, types features & functions of difference ecosystems- Forest Grassland, Desert and Aquatic. B. Biodiversity & its conservation with special reference to India.

Unit-III

Environmental pollution- Air, Water, Soil, Marine, Noise, Thermal, Nuclear- Introduction causes and control measures.

Unit IV

Law related to Environmental Protection

Air (Prevention and Control of pollution)Act 1987 Water prevention & Control of Pollution Act. 1974

Unit-V

Environmental Protection Act -1986

Noise Pollution

Hazardous Wastes

Hazardous Chemical

Hazardous Microorganism
Biomedical Waste
Provisions applicable to drugs and cosmetic.

BPHP 183- Project/assignment

Books recommended

1. Principles of Environmental Studies, C. Manoharachary, P. Jyaranama Reddy, Pharma Book Syndicate, Hyderabad.
2. Handbook of Environmental Laws, Acts, Guidelines, Compliances & Standards Vol. I & II. R.K.Trivedi, Pharma Book Syndicate, Hyderabad
3. Relevant Acts & Rules published by Govt. of India with latest amendments.
4. Reddy, M.Anji , ‘ Text Book of Environmental Sciences & Technology’.

BPH 184 Elective –II

(A) PHARMACEUTICAL SALES & MARKETING-II

Unit I

Prescribing habits of physician and development of Predetermined behavioral action (how to convert the physicians prescriptions towards your products)

Unit II

Market Analysis and proactive strategies

Unit III

Marketing branded and generic drugs

Unit IV

Retail Competition, International marketing

Unit V

Concept of Internal and External control

BPHP 184-Project based on theory syllabus.

(B) NOVEL DRUG DELIVERY SYSTEM-II

Unit-I

Microencapsulation: Methods, kinetics of drug release from microcapsules technology and applications.

Unit-II

Targeted Drug Delivery : History, concept, types and key elements, ideal carrier system and approach with special reference to organ targeting (e.g brain, tumor, lung, liver and lymphatics)

Unit-III

Colloidal Polymeric Delivery systems: Microspheres, Nanoparticles, Niosomes (Method of preparation, characterization, evaluation and pharmaceutical applications).

Colloidal Lipidic Delivery systems: Multiple w/o/w emulsions as drug vehicles: Introduction, composition of the multiple emulsion and stability, influence of the nature of oily phase, methods for stabilizing w/o/w multiple emulsions, mechanisms of transport of solutes, in vivo studies.

Unit-IV

Solid lipid nanoparticles, liposomes in drug targeting, pharmacosomes.

Unit-V

Nutraceuticals- Introduction, evaluation & scope

BPHP 184-Project based on theory syllabus.

Books Recommended

1. J.R. Robinson & V.H.L. Lee (Eds.) Controlled Drug Delivery, Fundamentals and Applications. Vol 29 & Vol 3, 2nd Edition, Marcel Dekker, N.Y. 1987
2. S.D. Bruck, Controlled Drug Delivery, Vol-I9 (Basic Concepts) CRC Press, Florida, 1983
3. S.D. Bruck, Controlled Drug Delivery, Vol II (Clinical Applications), CRC Press, Florida, 1983.
4. P. Tyle and B. Ram. Targetted Therapeutic Systems, Marcel Dekker, N.Y., 1990.
5. Torchillin
6. Chien YW., 'Novel Drug Delivery Systems- Fundamentals, Development concepts.' Biomedical Assessment , Marcel Dekker, New York.
7. Schreier H., 'Drug Targeting Technology Physical, Chemical & Biological Methods,' Marcel Dekker, New York.
8. Banker GS & Rhodes C.T. , 'Modern Pharmaceutics', Marcel Dekker, New York.
9. Gennaro A.R., 'Remington, The Science & Practice of Pharmacy,' Lippincott. Williams & Wilkins.

(C) HERBAL DRUG TECHNOLOGY-II

Unit I

Standardization by HPTLC method

Unit II

Free radical induced damages and nutraceuticals

Unit III

Cosmoceuticals

Unit IV

Unexplored traditional use of plant material

Unit V

Websites of professional interest in pharmacognosy

BPHP 184-Project based on theory syllabus.

(D) DRUG DESIGN-II

Unit-I

Combinatorial chemistry-Introduction, Solid Phase synthesis Liquid phase synthesis, Parallel and Split & Mixed synthesis

Unit II

Computer in Drug Design: Computer requirements: Hardware, software. Data and information retrieval techniques. Graphical description of chemical structure. Molecular interactions and interactive graphics.

Unit-III

QSAR Introduction, parameters, Quantitative models- Hansch method & Soft ware's in QSAR.

Unit IV

QSAR Physicochemical parameters, Quantitative models, Introduction to 2D and 3D QSAR.

Unit V

Modeling in Medicinal chemistry- uses and limitations. Logico-structural approach, general principles, activity features selection within a series of compounds, activity prediction, Selection of topological and Topographical activity features.

BPHP 184-Project based on theory syllabus.

(E) DRUG REGULATORY AFFAIRS-II

Unit I

Introduction, structure & guidance of ICH, ISO & OECD.
Concept of C-GMP & its guidance.

Unit II

Concept of Validation:
Process validation, Analytical method validation, cleaning validation, validation of water system for pharmaceutical use and qualification stages.

Units III

Concept of GLP, OECD GLP guidance, 21 CFR part 58, Protocol & its content for conduct of non-clinical studies.

Unit IV

Concept of GCP:

Various terms used in clinical trials, Protocol & its content for conduct of clinical trials. Role of Principal investigator, sponsor & CRO. Role of IEC / IRB in the conduct of clinical trial.

Units V

Drugs & Cosmetics act with special references to schedule Y & schedule of medical devices.

BPHP 184-Project based on theory syllabus.

BPH 185 Recent Advances in Pharmacy

Unit I

Pharmacognostic studies on plants yet to be fully explored.

Quality control studies of herbal marketed formulations

Validation of traditional claims

Rediscovery of traditional system of medicine (procedures & products)

Unit II

Protein and Peptide Drug Delivery: Considerations in the physiological delivery of therapeutic proteins, carrier mediated transport of peptides and peptide analogues. Problems associated with the delivery of protein and peptides.

Dendrimers, nanotubes.

Unit III

Fullerenes: Introduction, chemistry, properties, synthesis and applications.

Drug polymer conjugates: Introduction, applications in pharmacy.

Unit IV

Receptor based pharmacological screening.

Unit V

Recent studies based on Cell lines and its pharmaceutical / therapeutic application

BPHP 185 - Project Report.
