**DEPARTMENT OF PHARMACEUTICAL SCIENCES**
**UNIVERSITY OF KASHMIR**
**SRINAGAR**

**COURSE No: BPH- IX**

## PHARMACEUTICS-IV

**(Pharmaceutical Microbiology including Biological Pharmacy)**

**Total teaching hours: 50**

### 1. Introduction:

History of Microbiology, its branches and its importance; general microbiological techniques, identification, staining, enumeration etc. General classification of micro-organisms and study of bacteria, moulds, yeasts, viruses and actinomycetes-Nutrition, cultivation, isolation and identification; Effect of moisture, temperature, ion, light and PH on the growth of micro-organisms; bacteriological media; Bacterial metabolism-EMP and TCA pathways; salient features of common communicable: disease producing microbes; study of different types of microscopy; bacterial resistance. **No. of Lectures: 7**

### 2. Immunology:

Introduction, types of Immunity, Immunological products like sera, vaccines, toxoids: Phagocytosis, antigens, antibodies, components; lmmune systems-humoral immunity, cellular immunity, privileged graft sties, graft host reaction; tolerance, immunogenetics; Types of reaction and their application.

Preparation and standardization of Immunological products e.g. BCG vaccines, diphtheria toxoids, small pox vaccine, poliomyelitis vaccine; tetanus anti-toxin, diagnostic biologicals; General method of the preparation of bacterial vaccines, toxoids, viral vaccines; rickettsial vaccines; anti-toxins; serum-immune blood derivatives and other products relative to imrnunity: lnterferon.

**No. of Lectures: 8**

### 3. Disinfection

Factors influencing disinfection; dynamics of Disinfection: disinfectants, antiseptics and their evaluation. **No. of Lectures: 4**

### 4. Sterilization methods and Principles:

Methods of sterilization; Physical, chemical, Heat, Radiation, Gaseous, Filtration, Evaluation of the efficiency of sterilization methods; Equipments employed in large scale sterilization. Examples of the materials sterilized by different methods. Sterility indicators

**No. of Lectures: 4**

### 5. Sterility testing of Pharmaceutical Products:

Sterility testing of products according to IP, BP and USP. Sterility testing of parenteral products-solids, liquids; Opthalmic and other sterile products according to the I.P, B.P., and U.S.P. Sterility testing of sterile surgical devices; dressings, implants, absorbable, haemostats, surgical ligatures and sutures, surgical catgut etc.

**No. of Lectures:3**

### 6. Aseptic Technique:

Designing of aseptic area, study of laminar flow equipments, study of different sources of contamination, aseptic area and methods of prevention. **No. of Lectures: 3**

### 7. Fermentation Technology:

Fermentation methods and general requirements; study of media, equipments. Sterilization methods, aeration process, stirring etc. Large scale production fermenter design and its various controls. Study of the production of penicillins, citric acid, fungal diastase and dextran. **No. of Lectures ;10**

## 8. Microbiological Standardisation:

Microbiological methods for standardization of antibiotics, vitamins and amino acids; immunoassay; assessment of a new antibiotic and testing of antimicrobial activity of a new substance. **No. of Lectures: 4**

## 9. Microbial spoilage and preservation of Pharmaceutical Products:

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants; assessment of microbial contamination and spoilage; preservation of pharmaceutical products using antimicrobial agents; Evaluation of microbial stability of formulations. **No. of Lectures: 5**

## 10. Control of Microbial contamination during manufacture:

General aspects-environmental cleanliness and hygiene, quality of starting materials, process design, quality control and documentation **No. of Lectures: 2**

## PRACTICALS:

Total Hours: 100

Exercise illustrating the course contents of theory including:

1. Preparation of various types of culture media
2. Studying of different laboratory equipments and processing e.g., B.O.D incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes etc
3. Sub culturing of aerobic and slants preparation.
4. Various staining methods- Simple, Gram staining and acid fast staining, Structural staining etc.
5. Isolation of pure culture of micro-organisms and identification of micro-organisms.
6. Evaluation of sterilizing techniques.
7. Evaluation of antiseptic and disinfectants e.g. RWC, FDA method and Chick martin.
8. Sterility testing - Different methods as per I.P/B.P/USP.
9. Hanging drop slide preparation.
10. Bio-chemical reactions - Starch hydrolysis, Nitrate reduction, Litmus milk test, Gelatin liquefaction and haemolysis of blood.
11. Microbial viable count in a Pharmaceutical product, total count of bacteria.
12. Thermal death time.
13. Microbiological assay of antibiotics & Vitamin $B_{12}$
14. Test for limit of alkalinity of glass containers of parenteral preparations, whole container and crushed glass test.
15. Pyrogen testing.
16. Standardization of surgical dressings, Sutures and Ligatures.
17. Studying the effect of temperature , pH of the medium etc. on growth.
18. Isolation of antibiotic producer.
19. Bacteriophage isolation and characteristics.
20. Standard analysis of water & Biochemical oxygen demand.
21. Normal throat flora.
22. Studying of the environment microflora and testing of aseptic area e.g. Dextrose injection, Calcium gluconate injection, Oily injections, Injection of Vitamins etc.

## BOOKS RECOMMENDED


1. W.b. Hugo and A.D Russel, Pharmaceutical Microbiology
2. Malcolm Harris, Balliere Tindall and COX, Pharmaceutical Microbiology.
3. Gilbert S. Banker and Christopher T. Rhodes, Modern Pharmaceutics.
4. Remington's Pharmaceutical sciences
5. Peiezar and Reid, Microbiology.
6. Dawson and Mirne, Irnmunological and Blood products.
7. Rose, Industrial Microbiology.
8. Prescot and Dunn, Industrial Microbiology.
9. Probisher, Hinsdill et al, Fundamental of Microbiology, 9th edition.
10. Cooper & Gunn's Tutorial Pharmacy"
11. Peppler, Microbial technology.
12. I.P, 1985, B.P. 4V., USP
13. Ananthanaryar textbook of Microbiology
14. Edward, Fundamentals of Microbiology, 5th Ed. 1977.

**DEPARTMENT OF PHARMACEUTICAL SCIENCES**
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**COURSE NO: BPH X**

**PHARMACEUT1CS-V**
**(Physical Pharmacy)**
**Total lectures: 60**

**1. UNIT-I**

**Surface Activity.**

General characters and classification of surfactants, Hydrophilic- Lipophilic system, solubilization and factors affecting solubilization, Mechanism of solubilization, Pharmaceutical applications of solubilization. Micelle formation, factors affecting Micelle formation, determination of critical micelle concentration. Detergency, Wetting agent, Contact angle, Foaming and Antifoaming agent. Pharmaceutical application of surface active agents.

**Surface and Interfacial Phenomenon:**

Surface tension and interfacial tension, determination of surface and interfacial tension, surface free energy, spreading co-efficient, complex films, adsorption isotherms, factors affecting adsorption and applications of adsorption.

**2. UNIT-II**

**Complexation- Protein binding**

Metal complexes, molecular organic complexes, inclusion complexes, method of analysis, protein binding, its applications and factors affecting protein binding of drugs. Experimental methods of determining protein binding.

**Drug stability:**

Physical degradation of Pharmaceutical products, chemical decomposition of drugs and their preventive measures. Influence of light and temperature on drug decomposition. Chemical stability testing in dosage forms and storage.

**Reaction kinetics:**

Molecularity of reactions, order of reaction, determination of order, complex reactions, factors affecting rate of reaction, accelerated stability analysis.

**3. UNIT-III**

**Viscosity and Rheology:**

Viscosity, factors affecting viscosity, Determination of flow properties, Viscoelasticity, Newtonian and Non-newtonian systems, thixotropy, Thixotropy measurement and applications. Rheopexy, negative thixotropy, applications of Rheology to Pharmacy.

**Gels:**

Types, structure, properties of gels, applications of gels in Pharmacy

**4. UNIT-IV**

**Micromeritics :**

Particle characteristics: Particle size, Shape and surface area.
Powder characteristics: Particle size distribution curves. Method of determining particle size, particle volume determination. Derived properties of powders. Flow properties of powders, angle of repose and improvement of flow properties.

**Physical stability:**

Suspensions and Emulsions.

**PRACTICALS:**

1. Simple experiments in support of theoretical aspects of course.
2. Methods of evaluation of usefulness of few selected suspending, emulsifying, binding and lubricating agents.
3. Measurement of angle of repose of loose powder and factors affecting flow of powders.
4. Viscosity determination of Newtonian and non-Newtonian liquid.
5. Determination of particle size by Optical, Microscopic and sieving analysis method.
6. Determination of HLB value of surfactant by modified gum acacia method.
7. Determination of HLB value of surfactant by saponification method.
8. Determination of CMC of surfactants by surface tension method.
9. Design conduction and supporting of accelerated test in studying chemical stabilization against hydrolytic decomposition of drug.
10. Experiments demonstrating the usefulness of solubilizing agent in forming a clear liquid phase of two immisible liquid.
11 .Determination of bulk density of pharmaceutical solids.
12. Determination of spreading coefficient of organic liquids by stalagamometer

**REFERENCE BOOKS:**

1. Physical Pharmacy by Alfred Martin
2. Berkley's textbook of Pharmaceutics by E.A.Rawlins
3. Remington's textbook of Pharmaceutical sciences.
4. Tutorial Pharmacy by cooper & Gunn
5. Textbook of Physical Pharmacy by Subramanyam
6. S.P.Aggarwal, Rajesh Khanna- Physical Pharmacy , C.B.S publishers, New Delhi.
7. H.S.Beans, A.H. Beckett and J.E. Carless, Advances in Pharmaceutical sciences, Vol 1- 4.

**DEPARTMENT OF PHARMACEUTICAL SCIENCES**
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**COURSE No: BPH-XI**

## PHARMACEUTICAL ANALYSIS-I
## (Inorganic Chemistry)
**Total teaching hours:50**

1. **Introduction:**
   Significance of quantitative analysis in quality control, different techniques of analysis.

2. **Acid-base titration:**
   Theories of acidimetry and alkalimetry, classification, direct titration of strong acids, strong bases, preparation and standardization of acids and bases. Some exercises related to the determination of acids and bases. Some official assay procedures e.g. boric acid, hydrochloric acid, sodium hydroxide, Zinc oxide, Sodium carbonate, tartaric acid, aspirin.

3. **Oxidation and reduction titrations:**
   Concepts of oxidation and reduction, redox reaction, strengths and equivalent weights of oxidizing and reducing agents, redox indicators, Potassium permanganate titrations, lodometry and lodimetry, Cerric ammounium sulphate titrations, Potassium iodate titrations, Pharmaceutical applications, preparation and standardization of redox titrants e.g Sodium thiosulphate etc.

4. **Precipitation titrations:**
   Preparation and standardization of titrants like Silver nitrate, Ammonium thiocynate ; titrations according to Mohr's and Volhard's methods; Ammounium and Potassium thiocynate titrations; Indicators; applications in Pharmaceutical analysis.

5. **Diazotisation titrations:**
   Different conditions involved in diazotisation of different amines, end point determination, Pharmaceutical analytical applications such as in the assay of sulfonamides.

6. **Gravimetric analysis**
   Introduction, precipitation, techniques, supersaturation, coprecipitation, digestion, washing of precipitates, filtration, filter paper and crucibles, ignition, specific examples of Gravimetric estimation like Sodium chloride, Barium as Barium sulphate, Aluminum
   as Aluminum oxide.

7. **Non-aqueous titrations:**
   Theoretical considerations, scope and limitations, acid-base equilibria; in non-aqueous

media, titration of weak bases, titration of weak acids, Pharmaceutical products should be selected for illustration e.g Ethosuximide, methyldopa etc.

8. **Complexometric titrations:**
   Types of complexometric titrations, metal ion indicators, factors influencing the stability of complexes and applications e.g. Calcium gluconate, Bismuth carbonate, Potassium alum.

**PRACTICAL: Total hours: 100**

***Acid-base titrations:** Preparation and standardization of acids and bases, some exercises related to the determination of acids and bases separately and in mixture form. Some official assay procedures e.g. of boric acid, ascorbic acid shall also be covered,

*** Oxidation-reduction titrations:** Preparation and standardization of some redox titrants e.g. Potassium permanganate, Potassium dichromate, Iodine, Sodium thiosulphate.etc. Some exercises related to the determination of oxidizing and reducing agents in the sample shall be covered. Exercises involving use of potassium iodate, potassium bromate, 2,6-dicholorophenol, indophenol, cerric ammonium sulphate shall be performed.

*** Precipitation titrations:** Preparation and standardization of titrants like silver nitrate and ammoinium thiocyanate, titrations according to Mohr's and Volhard's methods.

*** Gravimetric analysis**: Determination of water of hydration, some exercises related to Gravimetric estimation of metal ions such as barium, magnesium and calcium shall be covered.

**BOOKS RECOMMENDED:**


1. LM.Atherden, Bentley and Driver's Textbook of Pharmaceutical chemistry, Oxford University press, Delhi.
2. G.L.Jenkins, J.E. Christian, G.P. Hager, Quantitative Pharmaceutical chemistry, McGraw Hill Company, New York.
3. Pharmacopoeia of India,1985, Govt. of India, Ministry of Health, Delhi.
4. J.Bassett, R.C. Denney, G.H. Jeffery, J.Mendham, Vogel's Textbook of quantitative Inorganic Analysis, The ELBS and Longman, London.
5. A.H Beckett and J.B. Stenlake, Practical Pharmaceutical Chemistry, Vol 1 & II. The Athlone press of the University of London.

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**COURSE NO: BPH-XII**

## MEDICINAL CHEMISTRY-I

1. **Aromatic compounds:** Structure and resonance of benzene, aromatic character, mechanism of electrophilic aromatic substitution, Orientation effects in electrophilic substitution, nucleophilic aromatic substitution.
2. **Preparation, properties and actions of**: Phenols, Sulphonic acid and derivatives, Carboxylic acids, Carboxamides, Nitro compounds, amines, diazonium salts, aryl halides and ketones.
3. **Poly nuclear aromatic hydrocarbons:** Naphthalene, Phenanthrene and Anthracene.
4. **Heterocyclic compounds:** Study of fundamentals of heterocyclics, Nomenclature, methods of synthesis and important chemical reactions of the following:-
   **a. Five membered heterocycles:** Furan, Thiophene, Pyrrole, Thiazole, Oxazole, Imidazole, Pyrazole and tetrazole.
   **b. Six- membered heterocycles:** Pyridine, Pyridazine, Pyrimidine, Pyrazine and Pyrones.
   **c. Benz-fused heterocycles:** Quinoline, Isoquinoline, Indole, Acridines and Xanthone.
5. The following topics shall be treated covering outlines of synthetic procedures (of selected drugs), uses and structure activity relationship:-
   **a. Sedatives and Hypnotics:** Phenabarbitone, Allobarbitone, Meprobromate, Glutethimide, Chloral hydrate, Paraldehyde.
   **b. General Anesthetics**: Cyclopropane, Hatothane , thiopental sodium, Fentanyl citrate, Ketanine Hcl.
   **c. Local anesthetics:** Cocaine, Benzocaine, Dibucaine Hcl, Procaine, Lidnocaine.
   **d. Opioid Analgesics:** Morphine sulphate, Codeine, Dextromethorphan, Metazocin, Pethidine Methadone Hcl.
   **e. Cns Stimulants:** Caffiene, Aminophylline, Nikethamide, Pentetrazol, Bemigride.
   **f. Antiseptics and Disinfectants:** Ethyl Alcohal, Ethylene oxide, Cetyl pyridinium chloride, Glutarol, Halozone.
   **g. Sulphonamides:** Sulphanilamide, Sulphadiazine, Sulphacetamide, Sulphafurazole, Pthalyl sulphathiazole, Mafenide.
   **h. Thyroid harmones & Antithyroid drugs:** Thyroxine,Triiodothyronkine, Propyl thiouracil, Methimazole, Carbimazole.
   **i. Anticoagulants:** Warfarin, Phenidion, Dicumarol, Ethyl biscoumacetate, Coumadin.

**PRACTICALS: Total hours:100**

1. Identification of Organic compounds and preparation of simple derivatives.
2. Synthesis based on O-and N- acetylation, nitration and bromination.

**BOOKS RECOMMENDED:**


1. R.T.Morrison and R.N.Boyd, Organic chemistry,Allyn and Bacon Inc.Boston(USA)
2. I.L.Finar, Organic chemistry, Vol.I and II, the ELBS and Longman group Ltd. London.
3. LM.Atherden, Bentley and Driver's- A Textbook of Pharmaceutical chemistry, Oxford University press, Delhi.
4. F.G.Mann & B.C Saunders, Practical Organic chemistry, Longman, London and New York.
5. Vogels, Textbook of Practical Organic chemistry, Longman, London, New York.

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**COURSE NO: BPH-XIII**

## PHARMACOGNOSY- II

**(Total teaching hours: 50)**

1. Modern concept of Pharmacognosy, source of drugs from biological, marine and plant tissue culture.
2. Classification and chemistry of carbohydrates. Study of drugs dealing with biological sources, geographical distribution, collection, commercial production, chemical constituents, chemical tests for identity, substitutes, adulterants and uses of following drugs;
   **Starches, Acacia, Tragacanth, Sterculia, Guargum, Plantago and Honey.**
3. Study of Lipids, their chemistry, classification and biogenesis of lipid containing drugs dealing with general methods of extraction and purification of fixed oils, biological source, chemical constituents, tests for identity and use of the following;
   **Arachis oil, Castor oil, Sesame oil, Cotton seed oil, Olive oil, Chaul moogra oil, Bees wax.**
4. Drugs of animal origin: Shellac, Cochineal, Cantharides, Spermaceti, Wool fat.
5. Tannin counting drugs: Catechu (Black and pale), Tannic acid, Myrobalon, Katha industry in India.
6. Protein containing drugs: General chemistry and study of amino acids, Gelatin.
7. Plant allergens and allergenic substances.
8. Hallucinogens, narcotics and common poisonous plants of India.
9. General study of formation of secondary metabolites. Biogenesis of primary metabolites and importance of photosynthesis in formation of primary metabolites and their relationship to the formation of secondary metabolites (Calvine cycle , TCA cycle, Shikimic acid pathway, Embden Merrhoffs pathway, Acetate hypothesis, Isoprenoid compounds biosynthesis).
10. Evaluation of crude drugs.

**PRACTICALS: Total hours-75**

1. Microscopic and chemical study of the following powdered drugs: Leaf- Senna, Datura, Stem- Ephedra; Root- Rauwolfia; Seed- Nux-vomica, Plantago; Bark- Cinchona; Fruit- Fennel
2. Identification of the drugs on the basis of their organoleptic and chemical tests included in 2,3,4 and 5.

**BOOKS RECOMMENDED**


1. T.E.Walljs, Textbook of Pharmacognosy
2. Trease and Evans, Textbook of Pharmacognosy
3. Jackson and Snowdon, Powdered vegetable drugs, Stanley Thmes (Publishers) Ltd.
4. Mohd Ali, Textbook of Pharmacognosy, Birla Publications, New Delhi
5. Industrial Toxicology, edited by Philip J.Willians and James L. Burson
6. Modern Toxicology, edited by P.K.Gupta and D.K Salunkhe
7. Basic and Clinical Pharmacology by B.C Katzung
8. Evaluation of Drug activities: Pharmacometrics, Vol-1, edited by D.R.Laurance.
9. Textbook of preventive and social medicine by J.E Park and K.Park
10. A Handbook of Hygiene and Public health by Yash Pal Bedi.

11. Material published by Ministry of Health, Family planning and Urban development (Department of Family planning).

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**COURSE NO: BPH-X1V**

## PATHOPHYSIOLOGY, TOXICOLOGY AND HEALTH EDUCATION

**(Total teaching hours: 25)**

**1.** General aspect of Pathophysiology: Atrophy, necrosis, pain, irritation, inflammation, shock, allergy.

**2. Pathophysiology and clinical assessment of:**

i) Disorders of cells and tissues- hypoplasia, hyperplasia, hypertrophy, metaplasia, neoplasia and general considerations.

ii) Disorders of blood cells- Leukopenia, leukemia, erythrocyte disorders (anemia polycythemia etc.), diseases (thrombocytopenia, fibrinogen deficiency, purpura, etc.)

iii) Disorders of blood vessels and heart- atheroma, arterioslerosis, aneurysrns, thrombophlebitis, embolism, varicose veins, congestive cardiac failure, ischaemic heart disease, rheumatic heart diseases, arrhythmia, hypertension, Burger's disease,

iv) Disorders of the respiratory tract: tonsillitis, bronchitis, bronchial asthma, emphysema, cough.

v) Disorders of the digestive tract-gastritis, peptic ulcers, pancreatitis, cirrhosis of the liver, jaundice.

vi) Disorders of the urinary system- glomerulonephritis, renal calculi.

vii) Disorders of the nervous system and special senses- Multiple sclerosis, hypoxia, dementia, parkinson's disease, chorea, Alzheimer's disease, migraine, depression, schizophrenia.

viii) Disorders of the reproductive system- Impotency, infertility, cryptorchism.

ix) Disorders of bones, joint and cartilages - Osteoporosis, gout, arthritis, rickets.

x) Disorders of eye- glaucoma and cataract.

**3. TOXICOLOGY:**

i) Definition, scope and its branches.

ii) Mutagenicity , Teratogenicity and Carcinogenicity.

iii) Toxicity of heavy metals and their antidotes.

iv) Management of poisoned patients.

**4. HEALTH EDUCATION:**

i) Spread and prevention of communicable diseases- AIDS, sexually transmitted diseases, small pox, measles, influenza, diphtheria, whooping cough, meningitis, tuberculosis, polio-myelites, viral hepatitis, cholera, typhoid, diarrhoea, amoebiasis, malaria, filariasis, rabies, tetanus, leprosy.

ii) Control of population explosion, national family programme, means of contraception (mechanical, chemical, surgical, immunological, physical and physiological).

iii) Immunization- various vaccines, toxoids and their uses.

**BOOKS RECOMMENDED**

1. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson.
2. Pathophysiology in Medical science by H.E.A Mentz.

3. Introduction to human disease by Thomos H. Kent, Michael N. Hart.
4. Pathophysiology - Principles of disease by Marhta J. Miller.

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**COURSE NO: BPH XV**

**PHARMACOLOGY-I**
**Total hours-50**

**1. GENERAL PHARMACOLOGY**

i) Definition, scope and branches of Pharmacology. Historical development with special reference to India,
ii) Sources of Drugs
iii) Routes of drugs administration and drug delivery systems
iv) Dynamics of absorption, distribution and excretion of drugs
v) Basic pharmacokinetic parameters employed in the use of drugs, their bioavailability and biotransformations, metabolizing enzymes as targets of drug action (induction and inhibition)
vi) Mechanisms of drug action, drug receptors and cellular signaling systems
vii) Drug antagonism and synergism
viii) Drug dependence and related conditions
ix) Pharmacovigilance, Adverse Drug Effects and their monitoring, latrogenic Diseases
x) Pharmacogenetics
xi) Pharmacoeconomics

**2. PHARMACOLOGY OF AUTONOMIC NERVOUS SYSTEM**

i) Cholinergic receptors, cholinergic drugs (Parasympathomimetics, anticholinesterases), anticholinergic drugs.
ii) Adrenoceptors, sympathomimetics, adrenoceptor blockers and adrenergic neurone antagonists
iii) Drug action on autonomic ganglia (ganglionic stimulants, ganglion blocking agents).
iv) Neuromuscular blocking agents and centrally acting muscle relaxants

**3. AUTOCOIDS**

i) Histamine, Antihistaminics
ii) Serotonin, agonists and antagonists
iii) Arachidonic acid metabolites
iv) Angiotensin, Plasmakinins, VIP, neurotensin, Substance P, PAF

**4. DRUGS IN OCULAR PHARMACOLOGY**

Mydriatic and miotic agents and drugs used in glaucoma .

**PRACTICALS: Total Hours: 100**

1. Study of instruments used in experimental Pharmacology, smoking and fixing a kymograph
2. Handling of laboratory animals
3. Techniques of drug administration in animals
4. Influence of route of administration of drugs on drug response
5. Experiments on isolated tissue preparations
   i) To record the CRC of acetylcholine using frog rectus abdominis muscle

ii) Determination of dose ratio
iii) Study of competitive antagonism using acetylcholine and histamine as agonist
iv) Potentiation of acetylcholine responses with antichoiinesterases
v) Identification of an agonist using isolated tissue (frog rectus abdominis muscle)
vi) Determination of PD2Value

6. Study of drug absorption in vitro.
7. Determination of intraocular pressure in rabbits

**BOOKS RECOMMENDED**

**(Theory)**


1. Modern Pharmacology by C.R. Craig and R. E. Stitzel
2, Goodman Gilman's: The Pharmacological Basis of Therapeutics by Alfred Goodman Gilman, Theodore W. Rail, Nies and Taylor
11. Clinical Pharmacology by D.R. Laurence and P.N. Bennett
12. Essentials of Medical Pharmacology by K.D. Tripathi
13. Pharmacology and Pharmacotherapeutics by R.S. Satoskar and S.D. Bhandarkar
14. Essentials of Pharmacotherapeutics by F.S.K. Barar
15. Pharmacology by H.P. Rang and M.M. Dale
16. Lewis's Pharmacology, revised by James Crosland


**(Practicals)**


1. Pharmacological experiments on isolated preparations, Edinburgh University Publication, 1968.
2. Selected topics in Experimental Pharmacology by U.K. Seth, N.K. Dadkar and Usha G. Kamat
3. Handbook of Experimental Pharmacology by S.K. Kulkarni
4. Fundamentals of Experimental Pharmacology by M.N. Ghosh
5. Textbook of In-vitro Pharmacology by Ian Kitchen
6. Screening methods in Pharmacology by Robert A. Turner

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**COURSE NO: BPH-XVI**

**PHARMACEUTICS-HI**
**(Dispensing Pharmacy)**
**Total teaching hours-50**

**1. PRESCRIPTIONS:**

* Reading and understanding of prescriptions.
* Modern Methods of prescribing: Common Latin abbreviations.

**2. METROLOGY**

* Reducing and Enlarging recipes; percentage calculations %, w/v, v/v & w/w.
* Alcohol dilutions, use of Alligation methods; proof spirit.
* Isotonic solutions.mEq units
* Displacement value of suppositories.

**3. POSOLOGY**

* Dose and dosage of drugs, Factors influencing dose.
* Calculations of doses on the basis of age, sex and surface area.

**4. POWDERS**

Types of powders; their merits and demerits; Compounding, storage and packaging of:-

* Effervescent powders
* Granules, Cachets and tablet triturates
* Dusting powders.

**5. LIQUIDS DOSAGE FORMS:**

Preparation, merits, demerits, storage and packaging of solutions and mixtures of Pharmaceuticals.

**6. EMULSIONS AND SUSPENSIONS:**

* Emulsions: Definition; types and identification- their merits and demerits; use of emulsifying agents and stability of Emulsions.
* Suspensions: Definition; types, their merits and demerits ; use of suspending agents;

Flocculated and Deflocculated suspensions; stability of suspensions.

**7. SEMI-SOLID DOSAGE FORMS:**

* Ointment bases: dispensing, demerits and packaging aspects of ointments, pastes,

jellies, Poultice, Suppositories and Pessaries.

**8. TABLETS:**

Types of tablets: Merits and demerits; Storage and Packing.

**9. CAPSULES:**

Hard and soft Gelatin Capsules- their merits and demerits; Storage and packing.

**10. STERILE DOSAGE FORMS:**

Definition, types, their merits and demerits

* Elementary study of the formulation characteristics of the following types:-
* Injectable preparations
* Ophthalmic and ENT products
* Total Parenteral nutrition
* Dialysis fluids

General requirements of sterile dosage forms, Handling, Packaging, Storage and dispensing of sterile dosage forms.

**11. INTRODUCTION TO AYURVEDIC/UNANI TIBB DOSAGE FORMS**

**12. INCOMPATIBILITY IN PRESCRIPTIONS:**

Physical, Chemical, Biological and therapeutic incompatibility.

**13. LABELLING INSTRUCTIONS AND PRECAUTIONS WHILE DISPENSING VARIOUS DOSAGE FORMS.**

**CURRENT PATENT AND PROPRIETARY PRODUCTS:**

Study of the following classes of patent and proprietary products, generic and selected brand names: indications; Contra indications: ADR , available dosage forms; dose and packing.

* Antihypertensive drugs.
* Antiamoebic drugs
* Antihistaminic, Antiemetics
'* Antacids and Ulcer healing drugs
* Anti-diarrhoeals and laxatives.
* Respiratory drugs.
* Antibiotics.
* Analgesics- Antipyretics.

**PRACTICALS: (Total No. of hours-100)**

**EXPERIMENTS**

1. Student's Orientation:
   Introduction to the laboratory equipment, Weighing methodology, general instructions and handling of prescriptions, labeling instructions
2. Compounding and Dispensing of Prescriptions:
   At least 50 prescriptions representing the following classes of products should be compounded and dispensed : Powders, Capsules, tablets, mixtures, Emulsions: Lotions & Liniments; Ointments; Creams; Pastes; Suppositories; ENT preparations; Incompatibilities; Miscellaneous products.
3. Current Patent and Proprietary Products:
   A study of current patent and proprietary products. Students should be trained in patient counseling by discussing specific problems in major classes of patent and proprietary products.
4. Prescription Reading and Pricing:
   Minimum of 20 prescriptions from the clinical practice.
5. Legal and Ethical aspects of Dispensing and Compounding of prescriptions:
   The students should be trained about these aspects evaluated by questionnaires.
6. Demonstration of Immunological products and Pharmaceutical products involved in family planning programmes.