BACHELOR OF PHARMACEUTICAL
(B. PHARM.)

DETAILED SYLLABUS

SESSION 2013-14

SEMESTER I
FUNDAMENTAL MATHEMATICS
BPH 101

Objective: The basic objective of this course is to get familiar with basic mathematical tools.

Course Contents

Unit-I


Unit-II

Measures of Central value: Objectives and pre-requisites of an ideal measure, mean, mode and median.

Unit-II

Measures of dispersion, Range, Quartile Range, Mean deviation, standard deviation, correlation, rank correlation, T-test, F-test, X2 test, Standard error of means. T- Ratio of multiple, submultiples, allied and certain angles, application of logarithms in pharmaceutical computations.

Unit-IV

Analytical Plain Geometry: Certain co-ordinates, distance between two points, area of triangle, straight line, slope and intercept form, double intercept form normal (perpendicular form), slopepoint and two point forms, general equation of first degree.

Unit-V


Recommended Books

Objective: The main objective of this course is to get familiar with basic biology.

Course Contents

Unit-I

General survey of Animal Kingdom: Structure and life history of parasites as illustrated by amoeba, entamoeba, trypanosome, plasmodium, taenia, ascaris, schistosoma, oxyuris and ancylostoma.

Unit-II

General structure and life history of insects like mosquito, house fly, mites and silk worm.

Unit-III

Morphology and histology of root, stem, bark, wood, leaf, flower, fruit and seed, modification of stems and roots

Unit-IV

Plant cell: Its structure and non living inclusions, mitosis and meiosis, different types of plant tissues and their functions.

Unit-V

Classification of Plant Kingdom.

Recommended Books

1. Dutta A.C., Botany for Degree Students, Oxford.
Objective: The basic objective of this course is to get familiar with titration fundamentals, volumetric analysis and different titrimetry methods.

Course Contents

Unit-I

Significance of quantitative analysis in quality control different techniques of analysis, preliminaries and definitions, precision and accuracy

Unit-II

Fundamentals of volumetric analysis, methods of expressing concentration, primary and secondary standards

Unit-III

**Acid Base Titrations:** Acid base concepts, role of solvent, relative strengths of acids and bases, ionization, law of mass action, common-ion effect, ionic product of water, pH, hydrolysis of salts, Henderson-Hasselbach equation, buffer solution, neutralization curves, acid base indicators, theory of indicators, choice of indicators, mixed indicators, polyprotic system

Unit-IV

**Oxidation reduction Titrations:** Concepts of oxidation and 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 ceric sulphate, potassium iodate, potassium bromate, potassium permanganate.

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, mercuric nitrate indicators, Gay-Lussac method, Mohr’s method, Volhard’s method and Fajans’s method.

Recommended Books

Objective: The basic objective of this course is to get familiar with Indian compendia, pharmaceutical aids, gastrointestinal agents, electrolytes and trace elements.

Course Contents

Unit-I

A. Sources of impurities & their control, limit test for iron, arsenic, lead, heavy metals, chloride & sulphate.  
B. An outline of methods of preparation, uses, sources of impurities, tests of purity and identification and special tests, if any, of the following classes of inorganic pharmaceuticals included in Indian Pharmacopoeia. (1996)  
Gases and Vapours: Inhalants (oxygen), Anaesthetics (Nitrous oxide).  
Pharmaceutical aids and necessities: water, purified water, Water for Injection, Sterile Water for Injection, pharmaceutical acceptable glass, acids and bases.  
Topical Agents: Protectives (calamine, talc, kaolin), astringents (zinc oxide, zinc sulphate) and anti infectives (boric acid, hydrogen peroxide, povidone iodine, potassium permanganate).  
Dental Products: Dentifrices- anti-caries agents (Sodium fluoride).

Unit-II

Gastrointestinal Agents: Acidifying agents (Dil. HCl), antacids (Aluminium hydroxide, calcium carbonate,magnesium hydroxide, light & heavy magnesium oxide, light & heavy magnesium carbonate), cathartics (Disodium hydrogen phosphate, magnesium sulphate), protective and adsorbents (activated charcoal, light kaolin, aluminium sulphate), Miscellaneous Agents: Expectorants (ammonium chloride, potassium iodide), antioxidants (sodium metabisulphite).

Unit-III

Major Intra and extra- cellular electrolytes: Physiological ions, Electrolytes used for replacement therapy, acid-base balance & combination therapy (calcium chloride, calcium gluconate, calcium lactate, sodium dihydrogen phosphate, sodium acetate, sodium bi carbonate, sodium chloride, potassium chloride, magnesium chloride), Cationic and anionic components of inorganic drugs useful for systemic effects.

Unit-IV
**Essential and Trace Elements**: Transition elements and their compounds of pharmaceutical importance. Iron and haematinics (ferrous fumarate, ferrous sulphate, ferrous gluconate), mineral supplements (copper, zinc, chromium, manganese, sulphur, iodine).

**Co-ordination compounds and complexation**: study of such compounds used in therapy including poison antidotes (calcium folinate, sodium thiosulphate).

**Unit-V**

**Inorganic Radio-Pharmaceuticals**: Nuclear radio pharmaceuticals, nomenclature, methods of obtaining, standards and units of activity, measurement of activity, clinical application and dosage, hazards and precautions.

**Recommended Books**

3. *Indian Pharmacopoeia*.

**PHARMACEUTICS – I**

**(GENERAL PHARMACY)**

**BPH 105**

**Objective**: The basic objective of this course is to get familiar with history of pharmacy, pharmaceutical calculations, size reduction, mixing and extraction and galenicals.

**Course Contents**

**Unit-I**

**History of Pharmacy**: Origin & development of pharmacy, scope of pharmacy, introduction to pharmacopoeias with special reference to I.P, B.P., U.S.P.

**Pharmaceutical Additives**: Colouring, flavouring & sweetening agents, co-solvents, preservatives, surfactants & their applications, antioxidants. (**8 Hours**)

**Unit-II**

**Size Reduction**: Definition, factors affecting size reduction, principles, laws & factors affecting energy requirements, different methods of size reduction, study of mills & disintegrator, various methods & equipments employed for size separation.

**Unit-III**
Pharmaceutical calculations: Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing prescriptions, percentage solutions, allegation, alcohol dilution, proof spirit.

Unit-IV

Extraction & Galenicals: Extraction processes, study of infusion, decoction, digestion, percolation, maceration & their modifications, Factors affecting selection of extraction processes.

Unit-V


Recommended Books

3. Carter S.J., Cooper & Gunn’s Tutorial Pharmacy, CBS Publishers, Delhi.

HUMAN ANATOMY, PHYSIOLOGY & PATHOPHYSIOLOGY-I

BPH 106

Objective: The basic objective of this course is to get familiar with human body, organization, Anatomy & physiology of human body.

Course Contents

Unit –I

a. Introduction to human body & organisation of human body.
b. Functional & structural characteristics of a cell.

Unit-II
**Skeletal system:** Structure, composition & functions of skeleton. Classification of joints, types of movements 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.

**Unit-V**

Concepts of health & disease: Disease causing agents & prevention of disease.

**Recommended Books**


**FOUNDATION ENGLISH - I**

**BPH107**

**Course Contents:**

**Unit I**

**Functional Grammar:** Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection.

**Unit II**

**Vocabulary:** Word formation, Prefix, Suffix, Compound words, Conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary.
Unit III

**Communication:** Meaning & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication.

Unit IV

**Requisites of Sentence writing:** Fragmented sentences, A good sentence, expletives, Garbled sentences, Rambling sentences, Loaded sentences, Parallel Comparison, Squinting construction, Loose & periodic sentences.

**Text Books:**


**Reference Books:**


**PHARMACEUTICAL ANALYSIS-I (PRACTICAL)

BPH 108**

**Objective:** The basic aim of this course is to make students familiar with titration fundamentals, volumetric analysis and different titrimetry methods including understanding of typical analytical balances, weights, uses & its care.

**Course Contents**

1. **Standardization of analytical weights and calibration of volumetric apparatus.**
2. **Acid Base Titrations:** Preparation and Standardization of acids and bases, official assay procedures, e.g. boric acid etc.
3. **Oxidation Reduction Titrations:** Preparation & standardization of some redox titrates e.g. potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc. Some exercises related to determinations of oxidizing & reducing agents.
4. **Precipitation Titrations:** Preparation and standardization of titrates like silver nitrate and ammonium thiocyanate.
Recommended Books

3. *Indian Pharmacopoeia*.

**PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)**

**BPH 109**

**Objective:** The basic objective of this course is to get familiar with Indian Compendia, Pharmaceutical Aids, Gastrointestinal Agents, Electrolytes and Trace Elements.

**Suggested 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 Compounds.

**Recommended Books**

3. *Indian Pharmacopoeia*.

**PHARMACEUTICS-I**

**(GENERAL PHARMACY)**

**(PRACTICAL)**

**BPH 110**

**Objective:** The basic objective of this course is to get familiar with general pharmacy formulations.

**Suggested List of Experiments**
I Preparation of following classes of Pharmaceutical dosage forms (involving the use of calculations in metrology) as official in IP, BP, and USP/NF.
1. Aromatic Waters: Chloroform water BP, Camphor Water BP.
2. Solutions: Lysol solution IP.
3. Syrups: Simple syrup BP, Simple syrup USP/NF.
4. Elixirs: Aromatic Elixirs USP/NF.
5. Spirits: Aromatic Ammonia spirit BP
6. Powders: ORS Powder IP.
7. Lotions: Calamine lotion IP.
8. Liniments: Methyl salicylate liniment BP.
9. Mucilage: Starch Mucilage IP.
10. Glycerine: Kaolin Poultice BP.
11. Tinctures & Extracts: Decoction of Ispaghula,: Compound benzoin tincture BP,: Strong Ginger tincture BP.

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

III Solid-Solid mixing.

Recommended Books

3. Carter S.J., Cooper & Gunn’s Tutorial Pharmacy, CBS Publishers, Delhi.

HUMAN ANATOMY, PHYSIOLOGY & PATHOPHYSIOLOGY-I (PRACTICAL)
BPH 111

Objective: The basic objective of this course is to get familiar with Microscopic study of different Tissues and Clinical Analysis.

Course Contents:

1. Study of Human Skeleton.
2. Microscopic study of different Tissues.
3. Estimation of haemoglobin in blood, Determination of bleeding time, clotting time, R.B.C. Count, Total leukocyte count, D.L.C. and E.S.R.
4. Recording of body temperature, pulse rate and blood pressure, basic understanding of Electrocardiogram – PQRST waves and their significance.
Recommended Books

BACHELOR OF PHARMACEUTICAL
(B. PHARM)

DETAILED SYLLABUS

SESSION 2013-14

SEMESTER II
PHARMACEUTICAL PHYSICAL CHEMISTRY
BPH 201

Objective: The basic objective of this course is to get familiar with physical chemistry.

Course Contents

Unit-I

Behaviour of Gases: Kinetic theory of gases, deviation from ideal behaviour and explanation.
The Liquid State: Physical properties (Surface tension, Parachor, Viscosity, Rheochor, Refractive Index, Optical Rotation, Dipole Moment) and chemical constituents.
Amorphous and Crystalline Solids: geometry & symmetry of crystals, Millers indices, types of crystals, Physical properties of crystals, crystal diffraction.
Solutions: Ideal and Real Solutions, Solutions of gases in liquids, Colligative Properties.

Unit-II

Thermodynamics: Fundamentals, first, second, third and zeroth law, Joule-Thompson’s effect, absolute temperature scale.
Thermo Chemistry: Definition & conventions, heat of reaction, heat of formation, heat of solution, heat of neutralisation, heat of combustion, Hess law of constant summation, Bomb calorimeter, bond energies, Kirchoffs equation.

Unit-III


Unit-IV


Unit-V

Chemical Kinetics: Zero, first and second order reaction, complex reactions, elementary idea of reaction kinetics, characteristics of homogenous and heterogeneous catalysis, acid base and enzyme catalysis.
Phase Equilibria: Phase, component, degree of freedom, phase rule. Cooling curves & Phase diagrams for one & two component system involving eutectics, congruent & incongruent melting point. Distribution law & application to solvent extraction.

Recommended Books
PHARMACEUTICAL ORGANIC CHEMISTRY – I
BPH 202

Objective: The basic objective of this course is to get familiar with stereochemistry, organic reactions, aromatic and aliphatic compounds.

Course Contents

Unit-I

Structure and Properties: Atomic structure, atomic orbital, molecular orbital, hybridization, sigma, pi bond, covalent, electrovalent, and co-ordinate bond, inductive effect, resonance, classification & Nomenclature of organic compounds.

Unit-II

Isomerism (Definition & classification), geometrical isomerism (R, S, & EZ erythro & threo Nomenclature) Stereochemistry including optical activity, stereoisomerism, specification of configuration and conformational analysis, conformation of cyclohexane

Unit-III

Introduction to organic reactions, Classification of SN1 and SN2 reactions, important methods of preparation, reactions with special reference to mechanism of the following classes of compounds: Alkanes, alkenes, alkynes & dienes, free radical substitution reaction, alkyl halides, Alcohols (Monohydric & Dihydric).

Unit-IV

Aromatic compounds, aromatic character, structure of benzene, resonance, orientation of aromatic substitution, arenes, amines (aliphatic & aromatic), phenols, aryl halides, O, P directing & activating & deactivating groups.

Unit-V

Aldehydes and ketones (aliphatic & aromatic), carboxylic acids & their derivatives, di & tricarboxylic acids, hydroxyl acids, Organometallic Compounds- Grignard reagent, organolithium compounds, their preparation and synthetic application

Recommended Books

Objective: The basic objective of this course is to get familiar with Autonomic and Central Nervous System, sense organs, lymphatic system and family planning.

Course Contents

Unit-I

**Autonomic Nervous System:** Physiology and functions of the autonomic nervous system. Mechanism of neurohumoral transmission of the Autonomic and Central Nervous System.

**Central Nervous System:** Functions of different parts of brain and spinal cord, reflex action, electroencephalogram, specialized functions of the brain. Cranial nerves and their functions.

Unit-II

**Sense Organs:** Basic anatomy and physiology of the eye (vision), ear (hearing), taste buds, nose (smell), and skin (superficial receptors).

Unit-III

**Lymphatic System:** Composition, formation and circulation of lymph, lymph node and spleen.

Unit-IV

**Demography and Family Planning:** Medical termination of pregnancy.

**First Aid:** Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods.

Unit-V

**Communicable Diseases:** Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea, and AIDS.

Recommended Books

Distributors, New Delhi.

**COMPUTER FUNDAMENTALS & PROGRAMMING**
**BPH 204**

**Objective:** The basic objective of this course is to get familiar with computers and programming Language.

**Course Contents**

**Unit-I:**
Basic computer organization functionality computer codes computer classification Boolean algebra, primary storage, secondary storage devices, input-output devices, computer software, computer languages, operating system, business data processing concepts, data communication and networks and advances.

**Unit-II**
Planning the computer program, algorithm, flowcharts, and decision tables

**Unit-III**
Writing simple programs in ‘C’, Numeric constants and variables, Arithmetic Expressions, Input & Output in ‘C’ Programs, conditional statements, implementing loops in programs, arrays, logical expressions, and control statements such as switch, break and continue functions, processing character strings, files in ‘C’.

**Unit-IV**
MS Office (Word, Excel, PowerPoint), Basic Database concept and classification, operations performed on database, using MS-Access. Internet Features.

**Unit-V**
Computer applications in Pharmaceutical and clinical studies

**Recommended Books**

ADVANCED MATHEMATICS
BPH 205

Objective: The basic objective of this course is to get familiar with differential equations and statistics.

Course Contents

Unit-I

Differential Equation: Revision of integral calculus, definition & information of different equations, equations of first order & first degree.

Unit-II

Definition & Importance of Statistics, collection of data, primary & secondary data, Merits and demerits of statistical measures, sample, sampling, probability, Non-probability Sampling.

Unit-III

Linear differential equation of order greater than one with constant coefficients, complimentary function and particular integral, simultaneous pharmaceutical applications

Unit-IV

Biometrics: Significant digits and rounding off numbers, data collection, random and non random sampling methods, sample size, data organization diagrammatic representation of data, bar, pie, 2-D and 3-D diagrams measures of central tendency, coefficient of variation, confidence (fiducially) limits.

Unit-V

Probability and events, Bayes theorem, probability theorems, probability distributions, elements of binomial and Poisson distribution, normal distribution, curve and properties, kurtosis and skewness, method of least squares, statistical inference, application of statistical concepts in pharmaceutical sciences.

Recommended Books


**FOUNDATION ENGLISH - II**

**BPH 206**

**Unit I**

**Functional Grammar:** Articles, Preposition, Tenses: Functions, Synthesis, Transformation, Spotting errors and correction of sentences.

**Unit II**

**Pre-Requisites of Technical written Communication:** One word substitution, Spelling rules, Words often confused & misused, Phrases.

**Unit III**

**The Structure of sentences/ clauses:** Adverb clause, Adjective clause, Noun clause. Sentences: Simple, Double, Multiple and complex, Transformation of sentences: simple to complex & vice-versa, simple to compound & vice-versa, Interrogative to assertive & to negative & vice-versa.

**Unit IV**


**Text-Books:**


**Reference Books:**

PHARMACEUTICAL PHYSICAL CHEMISTRY (PRACTICAL)  
BPH 207

Objective: The basic objective of this course is to get familiar with practical aspects of physical chemistry.

Experiments:

1. Determination of refractive index of given liquids.
2. Determination of rate constant of simple reaction.
3. Determination of surface tension.
4. Determination of partition co-efficient.
5. Determination of viscosity.
6. PH determination by different methods.
7. Determination of solubility.
8. Determination of specific rotation of sucrose at various concentrations and determine the intrinsic rotation.
9. Determination of cell constant, verify Ostwald dilution law and perform conductometric titration.

Recommended Books


PHARMACEUTICAL ORGANIC CHEMISTRY-I  
(PRACTICAL)  
BPH 208

Objective: The basic objective of this course is to get familiar with the techniques and methods for identification, purification and synthesis of compounds.

Suggested list of Practicals

1. Identification of elements and functional groups in given sample.
2. Purification of solvents like benzene, chloroform, acetone and preparation of absolute alcohol.
Recommended Books


**COMPUTER FUNDAMENTALS & PROGRAMMING (PRACTICAL)**

**BPH 209**

**Objective:** The basic objective of this course is to get familiar with computers and programming Language.

**Exercises based on the following are to be dealt:**

1. Computer operating system like DOS and Windows.
2. Simple Program in ‘C’ Language.
3. Introduction to MS-OFFICE (MS-Word, MS-Excel, Power Point).
4. Database development using MS access.

**Recommended Books**