Evaluation Scheme & Syllabus

for

B.Pharma First Year

On

Choice Based Credit System

(Effective from the Session: 2016-17)
Scheme of Evaluation (Choice Based Credit System)

Bachelor of Pharmacy (B. Pharm.)

**FIRST SEMESTER**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>L--T--P</th>
<th>T/P Marks (ESE)</th>
<th>Sessional Test</th>
<th>Assignment/Attendance</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>RPH-101</td>
<td>Pharmaceutical Chemistry-I (Pharmaceutical Inorganic Chemistry)</td>
<td>3---0---0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>RPH-102/ RPH-106</td>
<td>Pharmaceutics-I (General Pharmacy)/ Pharmaceutical Chemistry-II (Pharmaceutical Organic Chemistry)</td>
<td>3---0---0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>RPH-103</td>
<td>Anatomy, Physiology and Pathophysiology-I</td>
<td>3---0---0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>RPH-104/ RPH-109</td>
<td>Pharmaceutical Analysis-I/ Pharmacognosy-I</td>
<td>3---0---0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>RPH-105/ RPH-110</td>
<td>Computer Fundamentals/ Pharmaceutical Mathematics and Biostatistics</td>
<td>3---0---0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td><strong>Practical/ Project</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>RPH-101P</td>
<td>Pharmaceutical Chemistry-I (Pharmaceutical Inorganic Chemistry) Practical</td>
<td>0---0---4</td>
<td>50</td>
<td></td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>RPH-102P/ RPH-106P</td>
<td>Pharmaceutics-I (General Pharmacy) Practical/ Pharmaceutical Chemistry-II (Pharmaceutical Organic Chemistry) Practical</td>
<td>0---0---4</td>
<td>50</td>
<td></td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>RPH-103P</td>
<td>Anatomy, Physiology and Pathophysiology-I Practical</td>
<td>0---0---4</td>
<td>50</td>
<td></td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>RPH-104P/ RPH-109P</td>
<td>Pharmaceutical Analysis-I Practical/ Pharmacognosy-I Practical</td>
<td>0---0---4</td>
<td>50</td>
<td></td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>RPH-105P/ RPH-110P</td>
<td>Computer Fundamentals Project/ Pharmaceutical Mathematics and Biostatistics Project</td>
<td>0---0---4</td>
<td>50</td>
<td></td>
<td>50</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1000</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>
Bachelor of Pharmacy (B. Pharm.)

SECOND SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>L-T-P</th>
<th>T/P Marks (ESE)</th>
<th>Sessional Test</th>
<th>Assignment/Attendance</th>
<th>Total</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Theory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>RPH-206/</td>
<td>Pharmaceutical Chemistry-II (Pharmaceutical Organic Chemistry)/</td>
<td>3-0-0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>RPH-202</td>
<td>Pharmacetics-I (General Pharmacy)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>RPH-207</td>
<td>Pharmaceutical Chemistry-III (Pharmaceutical Physical Chemistry)</td>
<td>3-0-0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>RPH-208</td>
<td>Anatomy, Physiology and Pathophysiology-II</td>
<td>3-0-0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>RPH-209/</td>
<td>Pharmacognosy-I/Pharmaceutical Analysis-I</td>
<td>3-0-0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>RPH-204</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>RPH-210/</td>
<td>Pharmaceutical Mathematics and Biostatistics/Computer Fundamentals</td>
<td>3-0-0</td>
<td>70</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>RPH-205</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Practical/ Project</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>RPH-206P/</td>
<td>Pharmaceutical Chemistry-II (Pharmaceutical Organic Chemistry)</td>
<td>0-0-4</td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>RPH-202P</td>
<td>Practical/Pharmaceuticals-I (General Pharmacy) Practical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>RPH-207P</td>
<td>Pharmaceutical Chemistry-III (Pharmaceutical Physical Chemistry)</td>
<td>0-0-4</td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>8.</td>
<td>RPH-208P</td>
<td>Anatomy, Physiology and Pathophysiology-II Practical</td>
<td>0-0-4</td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>RPH-209P/</td>
<td>Pharmacognosy-I Practical/Pharmaceutical Analysis-I</td>
<td>0-0-4</td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>RPH-204P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>RPH-210P/</td>
<td>Pharmaceutical Mathematics and Biostatistics Project/Computer Fundamentals</td>
<td>0-0-4</td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>RPH-205P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1000</td>
</tr>
</tbody>
</table>
Syllabus

FIRST SEMESTER

RPH-101

PHARMACEUTICAL CHEMISTRY-I
(PHARMACEUTICAL INORGANIC CHEMISTRY)

An outline of methods of preparation, tests of identification and special tests (if any), of the individually mentioned inorganic pharmaceuticals.

Unit I
Sources of impurities and their control.
Limit tests for iron, arsenic, lead, heavy metals, chloride and sulphate.
Pharmacologically acceptable glass.

Gases and vapors: Inhalants (Oxygen), anesthetics (Nitrous oxide).

Unit II

Dental products: Dentifrices (Dicalcium Phosphate), anti-caries agents (Sodium fluoride).
Antioxidants: Sodium metabisulphite.

Unit III
Gastrointestinal agents: Antacids (Aluminium hydroxide, Calcium carbonate, Magnesium hydroxide, Magnesium carbonate-light and heavy, Bismuth sub-carbonate), Combination antacids. Cathartics (Disodium hydrogen phosphate, Magnesium sulphate). Protective and Adsorbents (Activated charcoal, Aluminium sulphate).


Unit IV
Major intra and extracellular electrolytes: Physiological ions, electrolytes used for replacement therapy (Sodium chloride, Potassium chloride, Calcium gluconate, Magnesium chloride). Combination therapy including ORS.

Essential and trace elements: Iron and haematinics (Ferrous sulphate, Ferrous gluconate, Ferric ammonium citrate). Mineral supplements (Cu, Zn, Cr, Mn, I).
Unit V

**Inorganic radiopharmaceuticals:** Radioactivity, units of radioactivity and radiation dosimetry, measurement of radioactivity, hazards and precautions in handling of radiopharmaceuticals, clinical applications of radiopharmaceuticals.

**Co-ordination compounds and complexation:** Co-ordination theory, chelates and their pharmaceutical importance, poison antidotes (Sodium thiosulphate).
RPH-101P

PHARMACEUTICAL CHEMISTRY-I
(PHARMACEUTICAL INORGANIC CHEMISTRY) PRACTICAL

1. To perform limit test of chloride, sulphate, iron and heavy metal arsenic in the given sample.
   Identification tests for acidic and basic radicals.

2. Preparation of following compounds-
   Boric acid
   Magnesium sulphate
   Magnesium carbonate
   Calcium carbonate
   Alum
   Zinc sulphate.

BOOKS RECOMMENDED:

5. Svehla, G. and Sivasankar, B. Vogel's Qualitative Inorganic Analysis, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), New Delhi.
RPH-102/RPH-202

PHARMACEUTICS-I
(GENERAL PHARMACY)

Unit I


Unit II

Prescription: Definition, types of prescription, handling of prescription, legality of prescription and specific Latin terms used in modern day prescription (sos, od, bd, tid, qid).

Pharmaceutical additives: Coloring, flavoring and sweetening agents, co-solvents, preservatives and their applications.

Unit III

Pharmaceutical calculations: Weights and measures, weighing of solids and measurement of liquids.

Posology: Introduction, calculation of doses for infants, enlarging and reducing recipes.

Percentage solutions, alligation method, alcohol dilution, proof spirit.

Unit IV

Introduction to Pharmaceutical dosage forms: Classification, formulation methods of powders, mixtures, syrups and elixirs and their labeling requirements.

Definitions: Solutions, spirits, infusions, paints, aromatic waters, mouth washes, gargles, lotions, liniments, pastes, ointments, creams, inhalations, tinctures, lozenges and pastilles.

Unit V

Size Reduction: Definition, principles, laws and mechanisms governing size reduction, factors affecting size reduction. Study of ball mill and fluid energy mill. Introduction to sieving methods.

1. Preparation of following classes of pharmaceutical dosage forms (involving the use of calculations in metrology) as official in I.P., B.P., U.S.P-N.F.
   a) Aromatic Waters
      i. Chloroform Water B.P.
      ii. Concentrated Peppermint Water B.P.
      iii. Strong Rose Water U.S.P.-N.F.
   b) Mixtures
      i. Mixture of Precipitated Chalk B.P.
      ii. Kaolin Mixture B.P.
   c) Syrups
      i. Simple Syrup B.P./U.S.P./I.P.
      ii. Ferrous Sulphate Syrup U.S.P.
   d) Powders
      i. ORS Powder I.P.
      ii. Absorbable Dusting Powder U.S.P.-N.F.
      iii. Effervescent Compound Powder B.P.C.

2. Study of the role of pharmaceutical additives in formulations
   a) Colouring agent:
      i. Compound Sodium Chloride Mouthwash B.P.
      ii. Phenol Gargle B.P.C.
   b) Flavouring agent:
      i. Orange Tincture I.P.
      ii. Potassium Citrate Mixture B.P.
   c) Sweetening agents:
      i. Simple Elixir I.P.
   d) Cosolvents:
      i. Camphor Water I.P.
      ii. Compound Iodine Throat Paint I.P. (Mandl’s Paint)
   e) Preservatives:
      i. Compound Zinc Sulphate Mouthwash B.P.C.
      ii. Calamine Lotion I.P.
   f) Surfactants:
      i. Cresol with Soap Solution I.P.
      ii. Turpentine Liniment B.P.

3. 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.

4. Experiments to illustrate mixing efficiency.
BOOKS RECOMMENDED:

5. Rawlins E.A., Bentley’s Text Book of Pharmaceutics, ELBS Bailliere Tindall.
RPH-103

ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY- I

Unit I
Introduction to human body and organization of human body.
Functional and structural characteristics of cell.
Structural and functional characteristics of tissues- epithelial, connective, muscle and nerve.

Unit II
Muscular system: Anatomy and physiology of skeletal and smooth muscle, energy metabolism, types of muscle contraction, muscle tone.

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

Unit IV
Communicable diseases: Brief outline, causative agents, modes of transmission and prevention (chicken pox, measles, influenza, diphtheria, tetanus, tuberculosis, leprosy, poliomyelities, malaria, rabies, dengue).

Unit V
Demography and family planning, medical termination of pregnancy.
First aid: Emergency treatment of shock, snake bites, burns, poisoning, fractures and resuscitation methods
RPH-103P

ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY-I PRACTICAL

1. Study of types of microscopes, their parts and functions.
2. To draw and study the organization of human body.
3. To study the human skeletal system.
4. To study various types of joints.
5. To study different prepared slides- such as muscle, nerve cells, epithelial tissues, connective tissues etc.
6. Examination of color vision and acuity of vision.
7. Identification of different tastes.
8. Examination of ear.
9. Techniques of tying of different types of bandages.
10. Study of emergency treatments in case of burns and poisoning.
11. To prepare and study different charts related to pathophysiology of communicable diseases.

BOOKS RECOMMENDED:

1. Marieb E.N. Human Anatomy and Physiology, Benazmin Cummings (Pearson Education Inc.), San Francisco.
2. Park K., Preventive and Social Medicine, Banarsidas Bhanot Publishers, Jabalpur.
PHARMACEUTICAL ANALYSIS-I

Unit I
Fundamentals of volumetric analysis, preliminaries and definitions, precision and accuracy, types of errors, methods of expressing concentration, primary and secondary standards, different techniques of analysis, Factors affecting the choice of analytical methods, significance of quantitative analysis in quality control.

Unit II
**Acid base titrations:** Acid base concepts, role of solvent, relative strengths of acids and bases, ionization, common-ion effect, pH, hydrolysis of salts, Henderson-Hasselbach equation, buffer solution, neutralization curves, acid base indicators, theory of indicators, choice of indicators, mixed indicators, polyprotic system. Assay of boric acid as per I.P.

Unit III
**Oxidation reduction titrations:** Concepts of oxidation and reduction, equivalent weights of oxidizing and reducing agents, theory of redox titrations-redox indicators, oxidation reduction curves. Titrations involving ceric sulphate, potassium permanganate, iodimetry and iodometry. Assay of ascorbic acid tablet as per I.P.

Unit IV
**Complexometric titrations:** Principle, complexing agents, indicators, masking and demasking, types of complexometric titrations and applications. Assay of alum and determination of hardness of water.

**Precipitation titrations:** Precipitation reactions and techniques, solubility products, Mohr’s method, Volhard’s method and Fajan’s method.

Unit V
**Miscellaneous methods of analysis:** Diazotization titrations, Karl-Fischer titration. Kjeldahl’s method of nitrogen determination. Radioassays (Autoradiography, RIA). Assay of sodium iodide (\(^{131}\)I) solution as per I.P.
PHARMACEUTICAL ANALYSIS-I PRACTICAL

1. Study of general glassware and apparatus required for various analytical procedures.
2. Study of various types of balances, standardization of analytical weights, weighing and calibration of volumetric apparatus.
3. Preparation and standardization of acids and bases (Primary and secondary standards) as per I.P.
4. Assay procedure of various drugs using acid base titrations as per I.P.
5. Preparation and standardization of some redox titrants (potassium permanganate, potassium dichromate, iodine, sodium thiosulphate etc).
6. Assay procedure of various drugs using redox titrations as per I.P.
7. Preparation and standardization of EDTA as per I.P.
8. Assay of magnesium hydroxide and magnesium sulfate as per I.P.
9. Determination of hardness of water as per I.P.
10. Preparation and standardization of sodium nitrite as per I.P.
11. Assay of sulfa drugs using diazotization titration as per I.P.
13. Preparation and standardization of silver nitrate and ammonium thiocyanate as per I.P.
14. Titrations based on Mohr’s, Volhard’s and Fajan’s methods.

BOOKS RECOMMENDED:

**RPH-105/RPH-205**

**COMPUTER FUNDAMENTALS**

**Unit I**
Definition and overview of computer, computer classification, computer organization, computer code, input devices, output devices, storage devices. Computer software, types of software. overview of computer networks, LAN, MAN, WAN. Internet, network topology. Internetworking: Bridges, repeaters and routers.

**Unit II**
**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. Basics in MS-DOS, internal and external commands in MS-DOS.

**Unit III**
Introduction to MS-OFFICE-2007, word 2007 document creation, editing, formatting table handling, mail merge. Excel-2007, editing, working retrieval, important functions, short cut keys used in EXCEL.

**Unit IV**
MS-Power point 2007-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.

**Unit V**
Computer applications in pharmaceutical and clinical studies, uses of internet in pharmaceutical industry.
RPH-105/RPH-205

COMPUTER FUNDAMENTALS PRACTICAL

Software lab to be used for the following:-

2. MS-Office 2003 (MS Word, MS Power point, MS Excel, MS Access).
4. Internet Features (E-mail, Browser etc.).

BOOKS RECOMMENDED

SECOND SEMESTER

RPH-206/RPH-106

PHARMACEUTICAL CHEMISTRY-II
(PHARMACEUTICAL ORGANIC CHEMISTRY)

Unit I
Introduction, classification and nomenclature of organic compounds.
Electron displacement in organic chemistry (inductive effect, resonance, hyperconjugation).
Stereochemistry including geometrical isomerism, optical isomerism, specification of configuration and conformational analysis.

Unit II
Reaction intermediates (free radicals, carbocations, carbanions, carbenes and nitrenes).
Introduction to aliphatic hydrocarbons and some of their characteristic reactions with mechanisms such as; alkanes (free radical substitution), alkenes and dienes (electrophilic and free radical additions), alkynes, cycloalkanes (types of strain including Baeyer strain theory).

Unit III
Introduction to aliphatic organic compounds and some of their characteristic reactions with mechanisms such as; alkyl halides and alcohols (nucleophilic substitution and nucleophilic elimination), amines, aldehydes and ketones (nucleophilic addition), carboxylic acids and their derivatives (nucleophilic acyl substitution).

Unit IV
Introduction to aromatic organic compounds, aromaticity, structure of benzene, electrophilic substitution, orientation and reactivity in electrophilic aromatic substitution, nucleophilic substitution, arenes, phenols. Polynuclear hydrocarbons (naphthalene).

Unit V
Introduction to synthetic organic chemistry: $\alpha$, $\beta$- Unsaturated carbonyl compounds. Compounds containing active methylene group (acetoacetic ester), organometallic compounds (Grignard's reagent), aryl diazonium salts and their synthetic importance.
Name reactions (including reaction mechanisms) and synthetic applications: Meerwein-Ponndorf-Verley reduction, Hofmann rearrangement, Mannich reaction, Diels Alder reaction.
PHARMACEUTICAL CHEMISTRY-II
(PHARMACEUTICAL ORGANIC CHEMISTRY-I) PRACTICAL

1. Identification of organic compounds (including elements and functional groups).
2. Synthesis of compounds involving acetylation, benzoylation, bromination, reduction and oxidation.
   Picric acid.
   Aniline.
   Acetanilide.
   Aspirin.
   Hippuric acid.
   $p$-Bromo acetanilide.
   Iodoform.
   Oxalic acid.
3. Purification of solvents like benzene, chloroform, acetone and preparation of absolute alcohol.

BOOKS RECOMMENDED:

PHARMACEUTICAL CHEMISTRY-III
(PHARMACEUTICAL PHYSICAL CHEMISTRY)

Unit I
Atomic structure and chemical bonding: Atomic structure, atomic orbital, molecular orbital, hybridization, covalent (sigma and pi) bond, electrovalent bond.

Chemical kinetics: Elementary idea of reaction kinetics-zero, first and second order reaction, complex reactions. Characteristics of homogenous and heterogeneous catalysis, acid-base and enzyme catalysis.

Unit II
Distribution law: Distribution law and application to solvent extraction.

Matter and its properties: Physical properties (surface tension, parachor, viscosity, rheochor, refractive index, optical rotation, dipole moment). Liquid crystals, glassy state, crystalline and amorphous solids and polymorphism.

Unit III
Thermodynamics: Fundamentals, first, second, third and zeroth law, Joule-Thompson’s effect, absolute temperature scale, conversion of temperature between different scales.


Unit IV

Unit V
Adsorption: Definition, types and mechanism of adsorption, pharmaceutical applications of adsorption.

Phase equilibria: Phase, component, degree of freedom, sublimation critical point, cooling curves, phase rule. One and two component systems (e.g. water, KI-H2O).
1. Determination refractive index of given liquids.
2. Determination of specific rotation of sucrose at various concentrations and determination of the intrinsic rotation.
3. Determination of rate constant of a simple reaction.
4. Determination of cell constant, verify Ostwald dilution law and perform conductometric titrations.
5. Determination of surface tension.
6. Determination of partition co-efficient.
7. Determination of viscosity.
8. Determine the parachor value.
9. Determine the rheochor value.
10. Determination of solubility.

BOOKS RECOMMENDED:

RPH-208

ANATOMY, PHYSIOLOGY AND PATHOPHYSIOLOGY-II

Unit I
Central nervous system: Anatomy of different parts of brain and spinal cord, reflex action, electroencephalogram, specialized functions of the brain. Cranial nerves and their functions.

Unit II
Autonomic nervous system: Physiology of the autonomic nervous system. Neurotransmitters, mechanism of neurohumoral transmission.

Unit III
Haemopoietic system: Composition and function of blood and its elements, erythropoiesis, blood groups, blood coagulation, Anemia.
Lymphatic system: Composition, formation and circulation of lymph, lymph node and spleen, thymus and pathophysiology of hypersensitivity and allergy.

Unit IV
Urinary system: Anatomy and physiology of urinary system, physiology of urine formation, acid-base balance, pathophysiology of renal failure, glomerulonephritis, urinary tract infection.

Unit-V
Digestive system: Parts of digestive system, their structure and functions. Various gastro-intestinal secretions and their role.
Pathology of peptic ulcer, ulcerative colitis, irritable bowel syndrome, hepatitis, cirrhosis of liver, pancreatitis.
1. Microscopic study of different tissues.
2. Haematological experiments:
   a) Estimation of haemoglobin in blood.
   b) Determination of bleeding time, clotting time.
   c) R.B.C. Count.
   d) Total leucocyte count (TLC), Differential leukocyte count (D.L.C.)
   e) E.S.R. and blood group.
3. Recording of body temperature, pulse rate and blood pressure.

BOOKS RECOMMENDED:
10. Sood, R. Medical Laboratory Technology: Methods and Interpretation, Jaypee Brothers, New Delhi.
PHARMACOGNOSY – I

Unit I
Definition history, scope and development of pharmacognosy.
Source of drug: Biological, marine, mineral and plant tissue culture as source of drugs.
Classification of drugs: Morphological, taxonomical, chemical and pharmacological, chemotaxonomy.

Unit II
Plant Description: Morphology and anatomy of leaves, woods, barks, inflorescences and flowers, fruits and seeds.

Unit III
Propagation, cultivation, collection, processing and storage of crude drugs:
  a. Factors influencing cultivation of medicinal plants, type of soils and fertilizers of common use.
  b. Pest management and natural pest control agents.
  c. Plant hormones and their applications.
  d. Polyploidy, mutation and hybridization with reference to medicinal plants.
  e. Poly Houses/ Green houses for cultivation.

Unit IV
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).

Unit V
Systematic pharmacognostic study of following:
Carbohydrates and derived products: Agar, Acacia, Honey, Isabgol, Starch, Tragacanth.
Lipids: Beeswax, Castor oil, Coca butter, Kokum butter, Hydnocarpus oil, Cod liver oil, Linseed oil, Wool fat, Rice-bran oil.
PHARMACOGNOSY-I PRACTICAL

1. Morphological characteristics of plant parts mentioned in theory.
2. Microscopical measurements of cell and cell contents-starch grains, calcium oxalate crystals and phloem fibres.
3. Determination of leaf constants such as stomatal index, stomatal numbers, vein islet numbers, vein termination number and palisade ratio.
4. Identification of crude drugs belonging to carbohydrates and lipids.
5. Preparation of herbarium sheets.

BOOKS RECOMMENDED:

Unit I

Unit II
Limit of functions, differentiation of logarithmic, trigonometric and exponential function (not proof), chain rule, integration as reverse of differentiation, method of substitution, integration by parts.

Unit III
Methods of collection of data, diagrammatic representation of data (Pie, Histogram, Bar diagram), types of sampling; mean, median, mode and standard deviation.

Unit IV
Karl Pearson’s coefficient of correlation, regression, method of least square of straight line, t-test, $\chi^2$ test, F-test.

Unit V
Probability: Simple probability, addition and multiplication of probabilities, binomial, Poisson’s and normal distributions.
RPH-210P/RPH-110P

PHARMACEUTICAL MATHEMATICS AND BIOSTATISTICS PROJECT

1. Collection of data by survey methods.
2. Classification and tabulation of data.
3. Frequency distribution table for collected data (discrete and continuous).
4. Calculation of mean, median, mode, standard deviation and coefficient of variation for collected data.
5. Graphical representation of frequency distribution of collected data (histogram, frequency polygram, frequency curve and ogive curve).
6. Chi-square testing for data analysis.

BOOKS RECOMMENDED:

1. Blair R.C., Taylor, R.A. Biostatistics for the Health Sciences, Dorling Kindersley India Pvt., Ltd.
2. Gupta S.P. Statistical Methods, Sultan Chand & Sons, New Delhi.