# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**

**Semester I**

**Academic year 2024-25**

## SCHEME OF TEACHING

| Course Code | Name of the Course | No. of hours | Tutorial | Credit Points |
|---|---|---|---|---|
| BP101T | Human Anatomy and Physiology-I (Theory) | 3 | 1 | 4 |
| BP102T | Pharmaceutical Analysis I (Theory) | 3 | 1 | 4 |
| BP103T | Pharmaceutics-I (Theory) | 3 | 1 | 4 |
| BP104T | Pharmaceutical Inorganic Chemistry (Theory) | 3 | 1 | 4 |
| BP105RBT | Remedial Biology (Theory)#* | 2 | - | 2 |
| BP105RMT | Remedial Mathematics (Theory)$* | 2 | - | 2 |
| BP101P | Human Anatomy and Physiology-I (Practical) | 4 | - | 2 |
| BP102P | Pharmaceutical Analysis I (Practical) | 4 | - | 2 |
| BP103P | Pharmaceutics-I (Practical) | 4 | - | 2 |
| BP104P | Pharmaceutical Inorganic Chemistry (Practical) | 4 | - | 2 |
| BP105RBP | Remedial Biology (Practical) #* | 2 | - | 1 |
| **Total** | | **28/30$/32#** | **4** | **24/26$/27#** |

$Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

#Applicable ONLY for the students who have studied Physics / Chemistry/ Mathematics at HSC and appearing for Remedial Biology (RB)course.

*** Non-University Examination (NUE)**

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

## SCHEME OF EVALUATION

| Course Code | Name of the Course | Marks Distribution | | | |
|---|---|---|---|---|---|
| | | University (End Semester Exam) | Institute | | Total |
| | | | Sessional Exams | Continuous Mode | |
| BP101T | Human Anatomy and Physiology-I (Theory) | 75 | 15 | 10 | 100 |
| BP102T | Pharmaceutical Analysis I (Theory) | 75 | 15 | 10 | 100 |
| BP103T | Pharmaceutics-I (Theory) | 75 | 15 | 10 | 100 |
| BP104T | Pharmaceutical Inorganic Chemistry (Theory) | 75 | 15 | 10 | 100 |
| BP105RBT BP105RMT | Remedial Biology (Theory)/ Remedial Mathematics (Theory) | 35 | 10 | 5 | 50 |
| BP101P | Human Anatomy and Physiology-I (Practical) | 35 | 10 | 5 | 50 |
| BP102P | Pharmaceutical Analysis I (Practical) | 35 | 10 | 5 | 50 |
| BP103P | Pharmaceutics-I (Practical) | 35 | 10 | 5 | 50 |
| BP104P | Pharmaceutical Inorganic Chemistry (Practical) | 35 | 10 | 5 | 50 |
| BP105RBP | Remedial Biology (Practical) | 15 | 5 | 5 | 25 |
| **Total** | | **440/475$/ 490#** | **100/110$/ 115#** | **60/65$/70#** | **600/650$/ 675#** |

$Applicable ONLY for the students who have studied Physics / Chemistry / Botany / Zoology at HSC and appearing for Remedial Mathematics (RM)course.

#Applicable ONLY for the students who have studied Physics / Chemistry/ Mathematics at HSC and appearing for Remedial Biology (RB)course.

*** Non-University Examination (NUE)**

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| **Subject Code: BP101T** | **Subject Title: Human Anatomy and Physiology-I (Theory)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective: Upon completion of this course, the students would be able to**

1. Describe gross morphology, structure, and functions of various organs of the human body.
2. Write various homeostatic mechanisms and their imbalances.
3. Identify, draw, and differentiate various tissues and organs of different systems of the human body.
4. Summarize coordinated working patterns of different organs of each system.

| **Teaching Scheme (Hours per week)** | | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|---|
| | | | **Theory** | | | **Total** |
| **Lecture** | **Tutorial** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | |
| 3 | 1 | 4 | 75 | 10 | 15 | 100 |

**Detailed Syllabus:**

| **Sr. No.** | **UNIT** | **Hours** | **Weightage (%)** |
|---|---|---|---|
| **1.** | **Introduction to human body**<br>Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.<br>**Cellular level of organization**<br>Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signalling pathway activation by extracellular signal molecule, Forms of intracellular signalling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine<br>**Tissue level of organization**<br>Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues | **10 Hours** | **22.22%** |

| | | | |
|---|---|---|---|
| **2.** | **Integumentary system,**<br>Structure and functions of skin<br>**Skeletal system**<br>Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction.<br>**Joints**<br>Structural and functional classification, types of joints movements and its articulation | **10 Hours** | **22.22%** |
| **3.** | **Body fluids and blood**<br>Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.<br>**Lymphatic system**<br>Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system | **10 Hours** | **22.22%** |
| **4.** | **Peripheral nervous system**<br>Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions ofspinal and cranial nerves.<br>**Special senses**<br>Structure and functions of eye, ear, nose and tongue and their disorders. | **8 Hours** | **17.77%** |
| **5.** | **Cardiovascular system**<br>Heart anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heartbeat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart. | **7 Hours** | **15.55%** |

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| **Subject Code: BP101P** | **Subject Title: Human Anatomy and Physiology-I (Practical)** |
|---|---|
| **Pre-requisite:--** | |

**Course Objective:** Upon completion of this course the student should be able to

1. Distinguish various tissues by observing morphology and structure through microscopy.
2. Identify various organs of the different body systems and describe their functions.
3. Identify various bones.
4. Record pulse rate and blood pressure
5. Analyze the problem, communicate suggested solution, and interpret the results.

| **Teaching Scheme (Hours per week)** | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| | | **Theory** | | | |
| **Practical** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | **Total** |
| 4 | 2 | 35 | 5 | 10 | 50 |

| **Sr. No.** | **Title of the Practical** |
|---|---|
| 1 | Study of compound microscope. |
| 2 | Microscopic study of epithelial and connective tissue |
| 3 | Microscopic study of muscular and nervous tissue |
| 4 | Identification of axial bones |
| 5 | Identification of appendicular bones |
| 6 | Introduction to hemocytometry. |
| 7 | Enumeration of white blood cell (WBC) count |
| 8 | Enumeration of total red blood corpuscles (RBC) count |
| 9 | Determination of bleeding time |
| 10 | Determination of clotting time |
| 11 | Estimation of hemoglobin content |
| 12 | Determination of blood group. |
| 13 | Determination of erythrocyte sedimentation rate (ESR). |
| 14 | Determination of heart rate and pulse rate. |
| 15 | Recording of blood pressure. |

**Recommended Study Material:**

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brother'smedical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill, Livingstone,New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MIUSA
4. Textbook of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother'smedical publishers, New Delhi.
9. Willson, K. J. W. Ross and Willsons foundation of anatomy and Physiology, Churchill livingstone, Edinburg.
10. Goyal, R. K., Natvar M. P. and Shah S. A., Practical Anatomy and Physiology, Latest Edition, B.S. Shah Prakashan, Ahmedabad.
11. Goyal, R. K., Natvar M. P. and Shah S. A., Anatomy and Physiology, Latest Edition, B.S. Shah Prakashan, Ahmedabad.
12. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MIUSA
13. Textbook of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
14. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterjee, Academic Publishers Kolkata
15. Rannade VG, Textbook of Practical Physiology, Latest edition, PVG Publisher, Pune
16. Human Anatomy and Physiology, Paul D. Anderson, Jones and Bartlett publisher, London

❖ **Web Materials:**

1. http:// www.visiblebody.com/
2. http://www.getbodysmart.com/
3. http:// www.innerbody.com
4. http:// libguides.middlesex.mass.edu/
5. http://wps.aw.com/bc_marieb_ehap_8/
6. http://scioly.org/wiki/index.php/Anatomy_and_Physiology

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| Subject Code: BP102T | Subject Title: Pharmaceutical Analysis (Theory) |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Describe principles and applications of various types of volumetric and electrochemical methods of pharmaceutical analysis.
2. Describe principle and applications of gravimetric analysis.
3. Perform calculations necessary to prepare desired concentration of standard, test solutions and calculation related to titration curve for various types of volumetric methods of pharmaceutical analysis.
4. Describe various errors involved in pharmaceutical analysis, their sources and proposing mitigation strategies for analytical errors.

| Teaching Scheme (Hours per week) | | | Evaluation Scheme (Marks) | | | |
|---|---|---|---|---|---|---|
| | | | Theory | | | Total |
| Lecture | Tutorial | Credit | University Assessment | Continuous Assessment | Internal Assessment | |
| 3 | 1 | 4 | 75 | 10 | 15 | 100 |

**Detailed Syllabus:**

| Sr. No. | UNIT | Hours | Weightage (%) |
|---|---|---|---|
| **1.** | **Pharmaceutical analysis**<br>Definition and scope, Different techniques of analysis, Methods of expressingconcentration, Primary and secondary standards, Preparation and standardization of various molar and normal solutions-Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassiumpermanganate and ceric ammonium sulphate.<br>**Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision, and significant figures.<br>**Pharmacopoeia:** Sources of impurities in medicinal agents, limit tests. | **10 Hours** | **22.22%** |

| | | | |
|---|---|---|---|
| **2.** | **Acid base titration:** Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves.<br>**Non-aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl. | **10 Hours** | **22.22%** |
| **3.** | **Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's methods, Fajan's method, estimation of sodium chloride.<br>**Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents,estimation of Magnesium sulphate, and calcium gluconate.<br>**Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. | **10 Hours** | **22.22%** |
| **4.** | **Redox titrations**<br>**a)** Concepts of oxidation and reduction<br>**b)** Types of redox titrations (Principles and applications) i.e., Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Diazotization, Titration with potassium iodate. | **8 Hours** | **17.77%** |
| **5.** | **Electrochemical methods of analysis**<br>**Conductometry:** Introduction, Conductivity cell, Conductometric titrations, applications<br>**Potentiometry:** Electrochemical cell, construction and working of reference (Standardhydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrodes), methods to determine end point of potentiometric titration and applications.<br>**Polarography:** Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications | **7 Hours** | **15.55%** |

| **Subject Code: BP102P** | **Subject Title: Pharmaceutical Analysis (Practical)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Prepare and standardize various titration solutions.
2. Perform various experimental tasks for volumetric and electrochemical titration.
3. Handle and operate various laboratory instruments for electrochemical analysis.
4. Describe principle and various terminologies related to volumetric and electrochemical analysis.
5. Analyze the problem, communicate suggested solution, and interpret the results.

| **Teaching Scheme (Hours per week)** | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| | | **Theory** | | | |
| **Practical** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | **Total** |
| 4 | 2 | 35 | 5 | 10 | 50 |

**List of Practical:**

| **Sr. No.** | **Title of the Unit** |
|---|---|
| 1 | Limit test of the following |
| | (a) Chloride |
| | (b) Sulphate |
| | (c) Iron |
| | (d) Arsenic |
| 2 | Preparation and standardization of |
| | (a) Sodium hydroxide |
| | (b) Sulphuric acid |
| | (c) Sodium thiosulfate |
| | (d) Potassium permanganate |
| | (e) Ceric ammonium sulphate |
| 3 | Assay of the following compounds along with |

| | |
|---|---|
| | (a) Ammonium chloride by acid base titration |
| | (b) Ferrous sulphate by Cerimetry |
| | (c) Copper sulphate by Iodometry |
| | (d) Calcium gluconate by Complexometry. |
| | (e) Hydrogen peroxide by Permanganometry. |
| | (f) Sodium benzoate by non-aqueous titration |
| | (g) Sodium Chloride by precipitation titration |
| 4 | Determination of Normality by electro-analytical methods |
| | (a) Conductometric titration of strong acid against strong base |
| | (b) Conductometric titration of strong acid and weak acid against strong base |
| | (c) Potentiometric titration of strong acid against strong base |

**Recommended Study Material:**

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone, Press of University of London
2. A.I. Vogel, Textbook of Quantitative Inorganic Analysis, Longman Sc & Tech
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, Vallabh Prakashan
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press
5. John H. Kennedy, Analytical chemistry principles, Brooks/Cole
6. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Govt. of India.
7. Gary D. Christian, Analytical Chemistry, Willey Publishers
8. Douglas Skoog, Stanley R. Crouch, Fundamental of Analytical Chemistry, Brooks/Cole.

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| Subject Code: BP103T | Subject Title: Pharmaceutics (Theory) |
|---|---|
| Pre-requisite: -- | |

**Course Objective:** Upon completion of the course student shall be able to

1. Summarize the history of the profession of pharmacy.
2. Describe the basics of different dosage forms, pharmaceutical incompatibilities, and compute pharmaceutical calculations.
3. Interpret and analyze the prescription.
4. Describe methodology for preparation of various conventional dosage forms and rationalize them.

| Teaching Scheme (Hours per week) | | | Evaluation Scheme (Marks) | | | |
|---|---|---|---|---|---|---|
| | | | Theory | | | |
| Lecture | Tutorial | Credit | University Assessment | Continuous Assessment | Internal Assessment | Total |
| 3 | 1 | 4 | 75 | 10 | 15 | 100 |

**Detailed Syllabus:**

| Sr. No. | UNIT | Hours | Weightage (%) |
|---|---|---|---|
| 1. | **Historical background and development of profession of pharmacy, Dosage forms, Prescription, Posology**<br>History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career,<br>Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.<br>Introduction to dosage forms, classification, and definitions.<br>Definition, Parts of prescription, handling of Prescription and Errors in prescription.<br>Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area | **10 Hours** | **22.22%** |
| 2. | **Pharmaceutical calculations, Powders, Liquid dosage forms.** | **10 Hours** | **22.22%** |

| | | | |
|---|---|---|---|
| | Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.<br>Definition, classification, advantages and disadvantages, Simple & compoundpowders – official preparations, dusting powders, effervescent, efflorescent, and hygroscopic powders, eutectic mixtures. Geometric dilutions.<br>Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques | | |
| **3.** | **Monophasic liquids, Biphasic liquids, suspensions, Emulsions**<br>Definitions and preparations of Gargles, Mouthwashes, Throat Paint,Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.<br>Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.<br>Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome. | **8 Hours** | **17.77%** |
| **4.** | **Suppositories, Pharmaceutical incompatibilities**<br>Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.<br>Definition, classification, physical, chemical, and therapeutic incompatibilities with examples. | **8 Hours** | **17.77%** |
| **5.** | **Semisolid dosage forms**<br>Definitions, classification, mechanisms, and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams, and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms. | **7 Hours** | **15.55%** |

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| **Subject Code: BP103P** | **Subject Title: Pharmaceutics (Practical)** |
|---|---|
| **Pre-requisite:** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Interpret the formula and prepare solid dosage forms.
2. Interpret the formula and prepare semi solid dosage forms.
3. Interpret the formula and prepare liquid dosage forms.
4. Analyze the problem, communicate suggested solution and interpret the results.

| **Teaching Scheme (Hours per week)** | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| | | **Theory** | | | |
| **Practical** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | **Total** |
| 4 | 2 | 35 | 5 | 10 | 50 |

**List of Practical:**

| **Sr. No.** | **Title of the unit** |
|---|---|
| 1 | Syrups |
| | a) Syrup IP |
| | b) Paracetamol paediatric syrup |
| 2 | Elixirs |
| | a) Piperazine citrate elixir |
| | b) Paracetamol paediatric elixir |
| 3 | Linctus |
| | a) Simple Linctus BPC |
| 4 | Solutions |
| | a) Strong solution of ammonium acetate |
| | b) Cresol with soap solution |
| | c) Lugol's solution |
| 5 | Suspensions |
| | a) Calamine lotion |
| | b) Magnesium Hydroxide mixture |
| | c) Emulsions |
| | d) Turpentine Liniment |
| | e) Liquid paraffin emulsion |
| 6 | Powders and Granules |
| | a) ORS powder (WHO) |

| | |
|---|---|
| | b) Effervescent granules |
| | c) Dusting powder |
| 7 | Suppositories |
| | a) Glycero gelatin suppository |
| | b) Cocoa butter suppository |
| | c) Zinc Oxide suppository |
| 8 | Semisolids |
| | a) Sulphur ointment |
| | b) Non staining iodine ointment with methyl salicylate |
| | c) Carbopol gel |
| 9 | Gargles and Mouthwashes |
| | a) Iodine gargle |
| | b) Chlorhexidine mouthwash |

**Recommended Study Material:**

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams andWalkins, New Delhi.
2. Carter S.J., Cooper and Gunn‘s-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.
4. Indian pharmacopoeia, Ministry of Health and Family Welfare, Govt of India.
5. British pharmacopoeia, United Kingdom.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea& Febiger Publisher, The University of Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, NewDelhi.
8. Carter S.J., Cooper and Gunn‘s. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley‘s Textbook of Pharmaceutics, English Language Book Society, Elsevier HealthSciences, USA.
10. Isaac Ghebre Selassie: Pharmaceutical Palletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.
13. Pharmaceutics-II, Dispensing Pharmacy, Dr. G. K. Jani, B.S. Shah Prakashan.
14. Dispensing Pharmacy- A Practical Manual, Sanmathi B. S., K. K. Mehta, Anshu Gupta, PharmaMed Press

| **Subject Code: BP104T** | **Subject Title: Pharmaceutical inorganic Chemistry (Theory)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Summarize the history and basics of pharmaceutical inorganic chemistry.
2. Classify various sources of contamination in pharmaceuticals.
3. Describe the limit test and its significance.
4. Interpret monograph of selected inorganic pharmaceutical compounds
5. Describe basics of radio pharmaceuticals and their therapeutic as well as diagnostic applications.

| **Teaching Scheme (Hours per week)** | | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|---|
| | | | **Theory** | | | **Total** |
| **Lecture** | **Tutorial** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | |
| 3 | 1 | 4 | 75 | 10 | 15 | 100 |

**Detailed Syllabus:**

| **Sr. No.** | **UNIT** | **Hours** | **Weightage (%)** |
|---|---|---|---|
| **1.** | **Impurities in pharmaceutical substances, General Method of preparations.**<br>History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate.<br>Assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes | **10 Hours** | **22.22%** |
| **2.** | **Acids, Bases and Buffers, Major extra and intracellular electrolytes, Dental products**<br>**Acids, Bases and Buffers**: Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations, and methods of adjusting isotonicity.<br>**Major extra and intracellular electrolytes**: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride*, Potassium | **10 Hours** | **22.22%** |

| | | | |
|---|---|---|---|
| | chloride, Calcium gluconate* and Oral Rehydration Salt (ORS), Physiological acid base balance.<br>**Dental products** : Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement. | | |
| **3.** | **Gastrointestinal agents, Acidifiers, Antacid, Cathartics, Antimicrobials.**<br>**Acidifiers:** Ammonium chloride* and Dil. HCl<br>**Antacid:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate*, Aluminum hydroxide gel, Magnesium hydroxide mixture<br>**Cathartics:** Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite<br>**Antimicrobials**: Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide*, Chlorinated lime*, Iodine and its preparations | **10 Hours** | **22.22%** |
| **4.** | **Miscellaneous compounds: Expectorants, Emetics, Haematinics, Poison and Antidote, Astringents**<br>**Expectorants:** Potassium iodide, ammonium chloride*.<br>**Emetics**: Copper sulphate*, Sodium potassium tartrate<br>**Haematinics:** Ferrous sulphate*, Ferrous gluconate<br>**Poison and Antidote:** Sodium thiosulphate*, Activated charcoal, Sodium nitrite<br>**Astringents**: Zinc Sulphate, Potash Alum | **8 Hours** | **17.77%** |
| **5.** | **Radiopharmaceuticals**<br>Radio activity, Measurement of radioactivity, Properties of α, β, γ radiations, Half-life, radio isotopes and study of radio isotopes - Sodium iodide $I^{131}$, Storage conditions, precautions & pharmaceutical application of radioactive substances. | **7 Hours** | **15.55%** |

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**
**Semester I**
**Academic year 2024-25**

| **Subject Code: BP104P** | **Subject Title: Pharmaceutical Inorganic chemistry (Practical)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Perform limit test as per the methods given in IP.
2. Identify given inorganic compounds through chemical tests.
3. Perform quantitative analysis of selected inorganic compounds.
4. Prepare inorganic pharmaceuticals following pharmacopeial procedures.
5. Analyze the problem, communicate suggested solution, and interpret the results.

| **Teaching Scheme (Hours per week)** | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| | | **Theory** | | | **Total** |
| **Practical** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | |
| 4 | 2 | 35 | 5 | 10 | 50 |

**List of Practical:**

| **Sr. No.** | **Title of the unit** |
|---|---|
| 1 | Limit tests for following ions |
| | (a) Limit test for Chlorides and Sulphates |
| | (b) Modified limit test for Chlorides and Sulphates |
| | (c) Limit test for Iron |
| | (d) Limit test for Heavy metals |
| | (e) Limit test for Lead |
| | (f) Limit test for Arsenic |
| 2 | Identification test |
| | (a) Magnesium hydroxide |
| | (b) Ferrous sulphate |
| | (c) Sodium bicarbonate |
| | (d) Calcium gluconate |
| | (e) Copper Sulphate |
| 3 | Test for purity |
| | (a) Swelling power of Bentonite |
| | (b) Neutralizing capacity of aluminium hydroxide gel |
| | (c) Determination of potassium iodate and iodine |
| 4 | Preparation of inorganic pharmaceuticals |
| | (a) Boric acid |
| | (b) Potash alum |
| | (c) Ferrous Sulphate |

**Recommended Study Material:**

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press ofUniversity of London, 4th edition.
2. A.I. Vogel, Textbook of Quantitative Inorganic analysis, Longman Sc & Tech
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, Vallabh Prakashan
4. M.L Schroff, Inorganic Pharmaceutical Chemistry, National Book Center
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry, Himalaya Publisher
7. Block and Roche, Inorganic, Medicinal and Pharmaceutical Chemistry, Lea and Febiger, US
8. R. A. Dav Jr. and A. L. Underwood, Quantitative analysis, Pearson education India.
9. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Govt of India.

| **Subject Code: BP105RBT** | **Subject title: Remedial Biology (Theory)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Identify diversity of living organism and its characteristic
2. Understand various systems of the human body.
3. Define essential requirements of plants nutrition, plant respiration, plant growth and development.
4. Identify types of cells and tissues.

| **Teaching Scheme (Hours per week)** | | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|---|
| | | | **Theory** | | | **Total** |
| **Lecture** | **Tutorial** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | |
| 2 | - | 2 | 35 | 5 | 10 | 50 |

**Detailed Syllabus:**

| **Sr. No.** | **UNIT** | **Hours** | **Weightage (%)** |
|---|---|---|---|
| **1.** | **Living world, Morphology of Flowering plants.**<br>Definition and characters of living organisms, Diversity in the living world, Binomial nomenclature, Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus.<br>Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed, General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledons. | **7 Hours** | **23.33%** |
| **2.** | **Body fluids and circulation, Digestion and Absorption, Breathing and Respiration.**<br>Composition of blood, blood groups, coagulation of blood, Composition, and functions of lymph, Human circulatory system, Structure of human heart and blood vessels, Cardiac cycle, cardiac output and ECG.<br>Human alimentary canal and digestive glands, Role of digestive enzymes, digestion, absorption and assimilation of digested food.<br>Human respiratory system, Mechanism of breathing and | **7 Hours** | **23.33%** |

| | | | |
|---|---|---|---|
| | its regulation,Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes. | | |
| **3.** | **Excretory products and their elimination, Neural control and coordination, Chemical coordination and regulation, Human reproduction**<br>Modes of excretion, Human excretory system- structure and function, Urine formation, Rennin angiotensin system.<br>Definition and classification of nervous system, Structure of a neuron, Generation and conduction of nerve impulse, Structure of brain and spinal cord, Functions of cerebrum, cerebellum, hypothalamus and medullaoblongata.<br>Endocrine glands and their secretions, Functions of hormones secreted by endocrine glands.<br>Parts of female reproductive system, Parts of male reproductive system, Spermatogenesis and Oogenesis, Menstrual cycle. | **7 Hours** | **23.33%** |
| **4.** | **Plants and mineral nutrition, Photosynthesis**<br>Essential mineral, macro and micronutrients<br>Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation.<br>Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factorsaffecting photosynthesis. | **5 Hours** | **16.66%** |
| **5.** | **Plant respiration, Plant growth and development, Cell - The unit of life, Tissues**<br>Respiration, glycolysis, fermentation (anaerobic).<br>Phases and rate of plant growth, Condition of growth, Introduction to plantgrowth regulators.<br>Structure and functions of cell and cell organelles. Cell division.<br>Definition, types of tissues, location, and functions. | **4 Hours** | **13.33%** |

# Gandhinagar Institute of Pharmacy

**Bachelor of Pharmacy (Undergraduate)**

**Semester I**

**Academic year 2024-25**

| **Subject Code: BP105RBP** | **Subject Title: Remedial Biology (Practical)** |
|---|---|
| **Pre-requisite: --** | |

**Course Objective:** Upon completion of the course student shall be able to

1. Differentiate various cells and tissues through histological examination.
2. Identify various types of cells inclusion.
3. Assess blood pressure, blood group and tidal volume.
4. Identify and recognize different bones of the human body.
5. Analyze the problem, communicate suggested solutions, and interpret the results.

| **Teaching Scheme (Hours per week)** | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|
| | | **Theory** | | | |
| **Practical** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | **Total** |
| 2 | 1 | 15 | 5 | 5 | 25 |

**List of Practical:**

| **Sr. No.** | **Title of the unit** |
|---|---|
| 1 | Introduction to experiments in biology |
| | (a) Study of Microscope |
| | (b) Section cutting techniques |
| | (c) Mounting and staining |
| | (d) Permanent slide preparation |
| 2 | Study of cell and its inclusions |
| 3 | Study of Stem, Root, Leaf, seed, fruit, flower and their modifications |
| 4 | Detailed study of frog by using computer models |
| 5 | Microscopic study and identification of tissues pertinent to Stem, Root Leaf, seed, fruit and flower |
| 6 | Identification of bones |
| 7 | Determination of Blood Group |
| 8 | Determination of Blood Pressure |
| 9 | Determination of Tidal Volume |

**Recommended Study Material:**


1. Practical human anatomy and physiology, S. R. Kale and R. R. Kale.
2. A Manual of pharmaceutical biology practical by S. B. Gokhale, C. K. Kokate and S. P. Shrivastava.

| **Subject Code: BP105RMT** | **Subject Title: Remedial Mathematics (Theory)** |
|---|---|
| **Pre-requisite: --** | |


3. Biology practical manual according to National core curriculum. Biology forum of Karnataka. Prof .M. J. H. Shafi
4. Botany for Degree students, A. C. Dutta, Oxford University Press Bombay


**Course Objective:** Upon completion of the course student shall be able to

(a) Understand basic concepts of functions of single variable and characteristics (types) of function through plots. Solution of equations

(b) Understand the algebra of matrices, basic concept of Statistics, computing descriptive statistics.

(c) Understand the concept of Integration and differentiation for future need.

| **Teaching Scheme (Hours per week)** | | | **Evaluation Scheme (Marks)** | | | |
|---|---|---|---|---|---|---|
| | | | **Theory** | | | |
| **Lecture** | **Tutorial** | **Credit** | **University Assessment** | **Continuous Assessment** | **Internal Assessment** | **Total** |
| 2 | - | 2 | 35 | 5 | 10 | 50 |

**Detailed Syllabus:**

| **Sr. No.** | **Unit details** | **Contact hours** | **Approx. Weightage %** |
|---|---|---|---|
| 1. | **Partial fraction:**<br>Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction , Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics<br>**Logarithms:**<br>Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.<br>**Function:**<br>Real Valued function, Classification of real valued functions,<br>**Limits and continuity :** | 6 hours | 20% |

| | | | |
|---|---|---|---|
| | Introduction , Limit of a function, Definition of limit of a function ($\in$ - $\delta$ definition) , $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$ , $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$, | | |
| 2. | **Matrices and Determinant:** Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or adjugated of a square matrix , Singular and non-singular matrices, Inverse of a matrix, Solution of system of linear of equations using matrix method, Cramer's rule, Characteristic equation and roots of a square matrix, Cayley–Hamilton theorem, Application of Matrices in solving Pharmacokinetic equations | 6 hours | 20% |
| 3. | **Calculus:** Differentiation : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivative of the sum or difference of two functions, Derivative of the product of two functions (product formula), Derivative of the quotient of two functions (Quotient formula) – Without Proof, Derivative of xn w. r. tx, where n is any rational number, Derivative of ex,, Derivative of loge x , Derivative of ax, Derivative of trigonometric functions from first principles (without Proof), Successive Differentiation, Conditions for a function to be a maximum or a minimum at a point. Application | 6 hours | 20% |
| 4. | **Analytical Geometry**: Introduction: Signs of the Coordinates, Distance formula, Straight Line : Slope or gradient of a straight line, Conditions for parallelism and perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line. Integration: Introduction, Definition, Standard formulae, Rules of integration , Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application | 6 hours | 20% |
| 5. | **Differential Equations :** Some basic definitions, Order and degree, Equations in separable form , Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations. | 6 hours | 20% |

| | | | |
|---|---|---|---|
| | **Laplace Transform :** Introduction, Definition, Properties of Laplace transform, Laplace Transforms of elementary functions, Inverse Laplace transforms, Laplace transform of derivatives, Application to solve Linear differential equations, Application in solving Chemical kinetics and Pharmacokinetics equations | | |

**Recommended study materials:**

1. Kreyszig, Erwin. Advanced engineering mathematics. John Wiley & Sons, 2010.
2. Stewart, James. "Calculus: Early Transcendentals, 6E." Belmont, CA: Thompson Brooks/Cole (2006).
3. Wylie, C. R., and L. C. Barrett. "Advanced Engineering Mathematics." McGraw-Hill,1982
4. Greenberg, Michael D. Advanced engineering mathematics. Prentice-Hall, 1988.
5. Thomas, G. B., and R. L. Finney. "Calculus with Analytic Geometry ( 9th Edition), 1996.", AddisonWesley Publishing.
6. Stewart, James, Lothar Redlin, and Saleem Watson. Algebra and trigonometry. Nelson Education, 2015.
7. Differential Calculus by Shanthinarayan
8. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
9. Integral Calculus by Shanthinarayan
10. Higher Engineering Mathematics by Dr. B. S. Grewal