

**Table-I: Course of study for semester I**

<b>Course code</b>	<b>Name of the course</b>	<b>No. of Hours per week/Total no of hours</b>	<b>Tutorial</b>	<b>Credit points</b>
BP101T	Human Anatomy and Physiology I– Theory	3/45	1	4
BP102T	Pharmaceutical Analysis I – Theory	3/45	1	4
BP103T	Pharmaceutics I – Theory	3/45	1	4
BP104T	Pharmaceutical Inorganic Chemistry – Theory	3/45	1	4
BP105T	Communication skills – Theory *	2/30	-	2
BP106RBT BP106RMT	Remedial Biology/ Remedial Mathematics – Theory*	2/30	-	D
BP107P	Human Anatomy and Physiology – Practical	4/60	-	2
BP108P	Pharmaceutical Analysis I – Practical	4/60	-	2
BP109P	Pharmaceutics I – Practical	4/60	-	2
BP110P	Pharmaceutical Inorganic Chemistry – Practical	4/60	-	2
BP111P	Communication skills – Practical*	2/30	-	1
BP112RBP	Remedial Biology – Practical*	2/30	-	D
<b>Total</b>		<b>32/34<sup>\$</sup>/36<sup>#</sup>/4 80/510<sup>\$</sup>/540<sup>#</sup></b>	<b>4</b>	<b>27</b>

#Applicable ONLY for the students who have studied Mathematics / Physics / Chemistry at HSC and appearing for Remedial Biology (RB) course. However for Remedial biology and Mathematics no credits to be allotted only 50 % passing i.e D grade will be prerequisite.

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

\* Non University Examination (NUE)

**Tables-X: Schemes for internal assessments and end semester examinations semester wise**

**Semester I**

Course code	Name of the course	Internal Assessment				End Semester Exams		Total Marks
		Continuous Mode	Sessional Exams		Total	Marks	Duration	
			Marks	Duration				
BP101T	Human Anatomy and Physiology I– Theory	10	15	1 Hr	25	75	3 Hrs	100
BP102T	Pharmaceutical Analysis I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP103T	Pharmaceutics I – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP104T	Pharmaceutical Inorganic Chemistry – Theory	10	15	1 Hr	25	75	3 Hrs	100
BP105T	Communication skills – Theory *	5	10	1 Hr	15	35	1.5 Hrs	50
BP106RBT BP106RMT	Remedial Biology/ Mathematics – Theory*	5	10	1 Hr	15	35	1.5 Hrs	50
BP107P	Human Anatomy and Physiology – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP108P	Pharmaceutical Analysis I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP109P	Pharmaceutics I – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP110P	Pharmaceutical Inorganic Chemistry – Practical	5	10	4 Hrs	15	35	4 Hrs	50
BP111P	Communication skills – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
BP112RBP	Remedial Biology – Practical*	5	5	2 Hrs	10	15	2 Hrs	25
<b>Total</b>		<b>70/75<sup>§</sup>/80<sup>#</sup></b>	<b>115/125<sup>§</sup>/130<sup>#</sup></b>	<b>23/24<sup>§</sup>/26<sup>#</sup> Hrs</b>	<b>185/200<sup>§</sup>/210<sup>#</sup></b>	<b>490/525<sup>§</sup>/ 540<sup>#</sup></b>	<b>31.5/33<sup>§</sup>/ 35<sup>#</sup> Hrs</b>	<b>675/725<sup>§</sup>/ 750<sup>#</sup></b>

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

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

\* Non University Examination (NUE)

# Semester-I

**Scope:** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

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

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

**Course Content:**

<b>Unit-I</b>	<b>10 hours</b>
<b>a) Introduction to human body</b>	3 hours
Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.	
<b>b) Cellular level of organization</b>	3 hours
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	
<b>c) Tissue level of organization</b>	4 hours
Classification of tissues, structure, location and functions of epithelial,	

muscular and nervous and connective tissues.

<b>Unit -II</b>	<b>10 hours</b>
<b>a) Integumentary system</b>	4 hours
Structure and functions of skin	
<b>b) Skeletal system</b>	4 hours
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.	
<b>c) Joints</b>	2 hours
Structural and functional classification, types of joints movements and its articulation	
<b>Unit-III</b>	<b>10 hours</b>
<b>a) Body fluids and blood</b>	7 hours
Body fluids, composition and functions of blood, blood cells, hemopoiesis, formation of hemoglobin, anaemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.	
<b>b) Lymphatic system</b>	3hours
Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system.	
<b>Unit-IV</b>	<b>08 hours</b>
<b>a) Peripheral nervous system:</b>	3 Hours
Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.	
<b>b) Special senses</b>	5 Hours
Structure and functions of eye, ear, nose, tongue, and their disorders.	
<b>Unit-V</b>	<b>07 hours</b>
<b>Cardiovascular system</b>	
Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.	

## Recommended Books:

1. Chatterjee, C.C., Human Physiology. Medical Allied Agency, Kolkata.
2. Ganong, W.F., Review of Medical Physiology. Prentice-Hall International, London.
3. Guyton, A.C., Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA.
4. Tortora, G.J. and Grabowski, S.R., 2005. Principals of Anatomy and Physiology. Harper Collins College Publishers, New York.
5. Vander, A.J., Sherman, J.H. and Luciano, D.S., Human Physiology. McGraw-Hill Publishing Co., USA.
6. Waugh, A. and Grant, A., Ross and Wilson's Anatomy and Physiology in Health and Illness. Churchill-Livingstone, London.
7. West, J.B., Best and Taylor's Physiological Basis of Medical Practice. Williams and Wilkins, Baltimore, USA.
8. Warwick, R. and Williams, P., Gray's Anatomy. Longman, London.
9. Chaudhari S K. Concise Medical Physiology. New Central Book Agency (P) Ltd., Calcutta.
10. Godkar P.B and Godkar D.P., Textbook of Medical Laboratory Technology. Bhalani Publishing House, Mumbai.
11. Joshi V.D. Practical Physiology. Vora Medical Publications, Mumbai.
12. DiFiore-Mariano S.H., Atlas of Human Histology. Lea and Febiger, Philadelphia.
13. Garg K., Bahel I. and Kaul M., A Textbook of Histology. CBS Publishers and Distributors, New Delhi.
14. Goyal, R.K., Patel, N.M. and Shah, S.A., Practical Anatomy, Physiology and Biochemistry. B. S. Shah Prakashan, Ahmedabad.
15. Ranade, V.G., Joshi, P.N. and Pradhan, S., Textbook of Practical Physiology. Pune Vidyarthi Griha Prakashan, Pune.
16. Singh, I., BD., Chaurasia's Human Anatomy. CBS Publisher and Distributors, New Delhi.
17. Singh, I., Textbook of Human Histology. Jaypee brothers Medical Publishers, New Delhi.
18. Mukherjee, K.L., Medical Laboratory Technology. Tata McGraw Hill Publishing Company Ltd. New Delhi.
19. Beck, W.S., Human Desigh: Molecular, Cellular and Systemic Physiology. Harcourt Brace Jovanovich Inc. New York.
20. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee Brothers medical publishers, New Delhi.
21. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
22. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
23. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
24. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.

## **BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)**

**4 Hours/week**

Practical physiology is complimentary to the theoretical discussions in physiology. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings. This is helpful for developing an insight on the subject.

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 haemocytometer.
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 haemoglobin 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.
16. Visit to Blood bank.

### **Recommended Books:**

1. Godkar P.B and Godkar D.P., Textbook of Medical Laboratory Technology. Bhalani Publishing House, Mumbai.
2. Joshi V.D. Practical Physiology. Vora Medical Publications, Mumbai.
3. DiFiore-Mariano S.H., Atlas of Human Histology. Lea and Febiger, Philadelphia.

4. Mukherjee, K.L., Medical Laboratory Technology. Tata McGraw Hill Publishing Company Ltd. New Delhi.
5. Beck, W.S., Human Design: Molecular, Cellular and Systemic Physiology. Harcourt Brace Jovanovich Inc. New York.
6. Chatterjee, C.C., Human Physiology. Medical Allied Agency, Kolkata.
7. Ganong, W.F., Review of Medical Physiology. Prentice-Hall International, London.
8. Guyton, A.C., Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA.
9. Tortora, G.J. and Grabowski, S.R., 2005.
10. Principals of Anatomy and Physiology. Harper Collins College Publishers, New York.
11. Vander, A.J., Sherman, J.H. and Luciano, D.S., Human Physiology. McGraw-Hill Publishing Co., USA.
12. Garg K., Bahel I. and Kaul M., A Textbook of Histology. CBS Publishers and Distributors, New Delhi.
13. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee Brother's medical publishers, New Delhi.



## BP102T. PHARMACEUTICAL ANALYSIS (Theory)

45 hours

### Scope

This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.

### Objectives

Upon completion of the course a student shall be able to understand -

- The principles of volumetric and electrochemical analysis.
- Carry out various volumetric and electrochemical titrations.
- Develop analytical skills.

### COURSE CONTENT

#### UNIT-1

- a) **Pharmaceutical analysis** - Definition and scope
- i. Different techniques of analysis
  - ii. Methods of expressing concentration
  - iii. Primary and Secondary standards.
- b) **Errors** : Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures
- 05 hours**

#### UNIT-II

- a) **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. Preparation and standardization of sodium hydroxide, hydrochloric acid, sulphuric acid, Estimation of ammonium chloride
- b) **Non aqueous titration:** Solvents, acidimetry and alkalimetry titrations, and estimation of sodium benzoate.
- 10 hours**

#### UNIT-III

- a) **Precipitation titrations:** Mohr's method, Volhard's method, Modified Volhard's method, Fajans method, and estimation of Sodium Chloride I.P.
- b) **Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, and estimation of Calcium gluconate I.P.
- c) **Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, and estimation of Barium sulphate I. P.
- 12 hours**

#### UNIT-IV

- Redox titrations**
- i. Concepts of oxidation and reduction
  - ii. Preparation and standardization of Potassium Permanganate I. P., Ceric Ammonium Sulphate I. P./B. P. and Sodium Thiosulphate I. P./B. P.
  - iii. Types of redox titrations (Principles and applications) : Permanganometry,
- 08 Hours**

Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titrations with Potassium Iodate I. P.

#### UNIT-V

**a) Electrochemical methods of analysis**

- i. **Conductometry** - Introduction, Conductivity cell, Conductometric titrations, applications.
- ii. **Potentiometry** - Electrochemical cell, construction and working of reference (Standard Hydrogen Electrode, Silver Chloride Electrode and Calomel Electrode) and Indicator Electrodes (Metal electrodes and Glass Electrode), methods to determine end point of potentiometric titration and applications.
- iii. **Polarography** - Principle and Ilkovic Equation.

**b) Refractometry** - Introduction, refractive index, specific and molar refraction, measurement of RI, Abbe's refractometer and applications.

**10 hours**

## **BP108P. PHARMACEUTICAL ANALYSIS (Practical)**

**4 Hours/week**

### **I. Preparation and standardization of**

- (1) Aq. Sodium Hydroxide I. P.
- (2) Aq. Sulphuric Acid I. P./ Aq. Hydrochloric Acid I. P.
- (3) Aq. Sodium Thiosulfate I. P.
- (4) Aq. Potassium Permanganate I. P.
- (5) Aq. Ceric Ammonium Sulphate I. P.

**3 turns**

### **II. Assay of the following compounds along with Standardization of Titrant**

- (1) Ammonium chloride by acid-base titration
- (2) Sodium benzoate I. P. by non-aqueous titration
- (3) Sodium chloride I. P. by precipitation titration
- (4) Calcium gluconate I. P. by complexometry
- (5) Hydrogen peroxide I. P./B. P. by Permanganometry
- (6) Ferrous sulphate I. P. by cerimetry
- (7) Copper sulphate I. P. by iodometry

**8 turns**

### **III. Determination of Normality by electro-analytical methods**

- (1) Conductometric titrations of strong acid against strong base
- (2) Conductometric titration of strong acid and weak acid against strong base
- (3) Potentiometric titration of strong acid against strong base (Using Sigmoidal and First order derivative plot)

**3 turns**

### **IV. Measurement of refractive index of some samples**

(Glycerol, Water, Rectified Spirit, Castor Oil I. P.)

**1 turn**

### **Recommended Books**

1. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Controller of Publications Edition, New Delhi.
2. British Pharmacopoeia, British Pharmacopoeia Commission, London, 2015.
3. Beckett, A.H. and Stenlake J. B., Practical Pharmaceutical Chemistry, Vol I, Stahlome Press, University of London.
4. Vogel, A. I., A Textbook of Quantitative Chemical Analysis, Thames Polytechnic, London, Longman Group, UK Ltd.
5. Connors K. A., A Textbook of Pharmaceutical Analysis, Third Edition, John Wiley and Sons.
6. Christian G. D., Analytical Chemistry, 6/Ed, John Wiley & Sons.
7. Mahadik K. R., Wadodkar S.G., More H. N, Pharmaceutical Analysis, Vol. I and II, Nirali Prakashan.
8. Kar Ashutosh, Pharmaceutical Drug Analysis, Minerva Press, New Delhi.
9. Day R. A. & Underwood A. L. Quantitative Analysis. 5/Ed., Prentice Hall of India Pvt.Ltd. New Delhi.
10. Skoog, A. D. West, D. M. et al. Fundamentals of Analytical Chemistry. 8/ Ed. Thomson Brookscole.
11. Willard Merit. Dean Settle, Instrumental Methods of Analysis, 7/Ed, CBS Publisher & Distributor.
12. Sharma, B. K. Instrumental Methods of Chemical Analysis, Goel Publishing House.

**Scope:** This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

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

- Know the history of profession of pharmacy
- Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
- Understand the professional way of handling the prescription
- Preparation of various conventional dosage forms

### **Course Content:**

#### **UNIT – I**

**10 Hours**

- **Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career.
- **Dosage forms:** Introduction to dosage forms, classification and definitions
- **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription.
- **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

#### **UNIT – II**

**10 Hours**

- **Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight.
- **Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.
- **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques

### UNIT – III

10 Hours

- **Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.
- **Biphasic liquids:**  
**Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.  
**Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

### UNIT – IV

08 Hours

- **Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
- **Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

### UNIT – V

07 Hours

- **Semisolid dosage forms:** 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 dosage forms

## **BP109P. PHARMACEUTICS I (Practical)**

**4 Hours / week**

### **1 . Syrups**

- a) Syrup IP'66
- b) Compound syrup of Ferrous Phosphate BPC'68

### **2. Elixirs**

- a) Piperazine citrate elixir
- b) Paracetamol pediatric elixir

### **3.Linctus**

- a) Terpin Hydrate Linctus IP'66
- b) Iodine Throat Paint (Mandles Paint)

### **4. Solutions**

- a) Strong solution of ammonium acetate
- b) Cresol with soap solution
- c) LugOL 'S SOLUTion

### **5. Suspensions (Any two experiments)**

- a) Calamine lotion
- b) Magnesium Hydroxide mixture
- c) Aluminium Hydroxide gel

### **6. Emulsions**

- a) Turpentine Liniment
- b) Liquid paraffin emulsion

### **7. Powders and Granules (Any three experiments)**

- a) ORS powder (WHO)
- b) Effervescent granules
- c) Dusting powder
- d) Divided powders

### **8. Suppositories (Any two experiments)**

- a) Glycero gelatin suppository
- b) Cocoa butter suppository
- c) Zinc Oxide suppository

### **8. Semisolids (Any two experiments)**

- 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 Books:

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, 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.
5. British pharmacopoeia.
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, New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Françoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.



**BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory) 45 Hours**

**Scope**

This subject deals with the concepts and monographs of inorganic drugs and pharmaceuticals.

**Objectives**

**Upon completion of course student shall be able to**

- Know the sources of impurities and methods to determine the impurities in drugs and pharmaceuticals
- Understand the medicinal and pharmaceutical importance of inorganic compounds

**COURSE CONTENT**

**UNIT I**

- a) **Impurities in pharmaceutical substances:** History of pharmacopoeia, sources and types of impurities, principle, reaction and procedure involved in the limit test for chloride, sulphate, iron, arsenic, lead and heavy metals, modified limit test for chloride and sulphate. **10 hours**
- b) **Water:** Different official waters and official control test for water.

**General methods of preparation and assay for compounds superscripted with asterisk (\*). Properties and Medicinal uses of Inorganic Compounds belonging to the following classes**

**UNIT II**

- a) **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.
- b) **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride\*, Potassium chloride, Calcium gluconate\* and Oral Rehydration Salt (ORS), Physiological acid base balance. **10 hours**
- c) **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

**UNIT III**

- a) **Gastrointestinal agents**
- Acidifiers:** Ammonium chloride\* and Dil. HCl
  - Antacid:** Ideal properties of antacids, combinations of antacids, Sodium bicarbonate\*, Aluminum hydroxide gel, Magnesium hydroxide mixture
  - Cathartics:** Magnesium sulphate, Sodium orthophosphate, **10 hours**
- b) **Protectives and Adsorbents:** Kaolin and Bentonite
- c) **Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations

#### UNIT IV

##### Miscellaneous Compounds

- a) **Expectorants:** Potassium iodide, Ammonium chloride
- b) **Emetics:** Copper sulphate\* , Sodium potassium tartarate
- c) **Haematinics:** Ferrous sulphate\*, Ferrous gluconate
- d) **Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite
- e) **Astringents:** Zinc Sulphate, Potash Alum

**08 hours**

#### UNIT V

**Radiopharmaceuticals:** Radio activity, measurement of radioactivity, properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, half-life, radio isotopes and study of radio isotopes - Sodium iodide<sup>131</sup> , Indium<sup>111</sup>, Calcium<sup>47</sup> , Chromium<sup>51</sup>, Erbium<sup>169</sup>, Gallium<sup>68</sup>, Technetium<sup>99m</sup> , Storage conditions, precautions & pharmaceutical applications of radioactive substances.

**07 hours**

**BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)**  
**4 Hours/Week**

- I. Limit Test of the following:**  
(1) Chloride (2) Sulphate (3) Iron (4) Arsenic (5) Lead (6) Heavy metals **6 turns**
- II. Identification test**  
(1) Magnesium hydroxide (2) Ferrous sulphate (3) Sodium bicarbonate (4) Calcium gluconate (5) Copper sulphate **3 turns**
- III. Test for purity**  
(1) Swelling power of Bentonite **3 turns**  
(2) Neutralizing capacity of Aluminum hydroxide gel  
(3) Determination of Potassium iodate and iodine in Potassium Iodide
- IV. Preparation of Inorganic Pharmaceuticals** **3 turns**  
(1) Boric acid (2) Potash alum (3) Ferrous sulphate

**Recommended Books**

1. Beckett, A.H. and Stenlake, J. B. 1970, Practical Pharmaceutical Chemistry, Vol I & II, 4<sup>th</sup> edn, Stahlone Press of University of London.
2. Jeffery, G. H., Bassett, J., Mendham, J. and Cdenney, R., Vogel's Textbook of Quantitative Chemical Analysis, 5<sup>th</sup> edn, Thames Polytechnic, Longman Group, UK Ltd, London.
3. Gundu Rao, P. 2008, Pharmaceutical and Medicinal Inorganic Chemistry, Vallabh Prakashan.
4. Bentley, A.O., Driver, J.E. and Atherden, L.M. 1969, Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, London.
5. Anand, S.K. and Chatwal, G.R. 2017, Inorganic Pharmaceutical Chemistry, Himalaya Publishing House Pvt Ltd.
6. Block, J.H., Roche, E.B., Soine, T.O and Wilson, C.O. 1974, Inorganic Medicinal and Pharmaceutical Chemistry, Philadelphia, PA.
7. Indian Pharmacopoeia, Ministry of Health and Family Welfare, Controller of Publications Edition, New Delhi.

**Scope:** This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

**Objectives:**

**Upon completion of the course the student shall be able to**

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively manage the team as a team player
4. Develop interview skills
5. Develop Leadership qualities and essentials

**COURSE CONTENT**

**UNIT – I**

• **Communication Skills:** Introduction, Definition, The Importance of Communication,

The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

• **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

**07 Hours**

• **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

**UNIT – II**

• **Elements of Communication:** Introduction, Face to Face Communication - Tone of

Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

**07 Hours**

• **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic c) Communication Style, Considerate Communication Style

**UNIT – III**

• **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an

Active Listener, Listening in Difficult Situations

**07 Hours**

• **Effective Written Communication:** Introduction, When and When Not to Use

Written

Communication - Complexity of the Topic, Amount of Discussion' Required,  
Shades of

Meaning, Formal Communication

• **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your  
Audience,

d) Organization of the Message

#### UNIT – IV

• **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview

• **Giving Presentations:** Dealing with Fears, Planning your Presentation,  
Structuring Your

**05 Hours**

iv. Presentation, Delivering Your Presentation, Techniques of Delivery

#### UNIT – V

• **Group Discussion:** Introduction, Communication skills in group discussion,  
Do's and

**04 Hours**

c) Dont's of group discussion.

**BP111P.COMMUNICATION SKILLS (Practical)**  
**2 Hours / week**

The following learning modules are to be conducted using wordsworth® English language lab software

**Basic communication covering the following topics**

Meeting People

Asking Questions

Making Friends

What did you do?

Do's and Dont's

**Pronunciations covering the following topics**

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

**Advanced Learning**

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

**Recommended Books: (Latest Edition)**

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2<sup>nd</sup> Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1<sup>st</sup>Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1<sup>st</sup>Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1<sup>st</sup>Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5<sup>th</sup>Edition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1<sup>st</sup> Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2<sup>nd</sup>Edition, New arrivals –PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1<sup>st</sup>Edition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1<sup>st</sup> Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1<sup>st</sup>Edition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4<sup>th</sup>Edition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2<sup>nd</sup>Edition, Mc Graw Hill, 1999

## **BP 106RBT.REMEDIAL BIOLOGY (Theory)**

**30 hours**

**Scope:** To learn and understand the components of living world, structure and functional system of plant and animal kingdom.

**Objectives:** Upon completion of the course, the student shall be able to

- know the classification and salient features of five kingdoms of life
- understand the basic components of anatomy & physiology of plant
- know understand the basic components of anatomy & physiology animal with special reference to human

### **COURSE CONTENT**

#### **UNIT I**

##### **Living world:**

- 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, Potista, Fungi, Animalia and Plantae, Virus,

**07 Hours**

##### **Morphology of Flowering plants**

- Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed.
- General Anatomy of Root, stem, leaf of monocotyledons & Dicotylidons.

#### **UNIT II**

##### **Body fluids and circulation**

- 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

##### **Digestion and Absorption**

- Human alimentary canal and digestive glands
- Role of digestive enzymes
- Digestion, absorption and assimilation of digested food

**07 Hours**

##### **Breathing and respiration**

- Human respiratory system
- Mechanism of breathing and its regulation
- Exchange of gases, transport of gases and regulation of respiration
- Respiratory volumes

#### **UNIT III**

##### **Excretory products and their elimination**

- Modes of excretion

**07 Hours**



- Human excretory system- structure and function
- Urine formation
- Renin angiotensin system

#### **Neural control and coordination**

- 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 medulla oblongata

#### **Chemical coordination and regulation**

- Endocrine glands and their secretions
- Functions of hormones secreted by endocrine glands

#### **Human reproduction**

- Parts of female reproductive system
- Parts of male reproductive system
- Spermatogenesis and Oogenesis
- Menstrual cycle

### **UNIT IV**

#### **Plants and mineral nutrition:**

- Essential mineral, macro and micronutrients
- Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

**05 Hours**

#### **Photosynthesis**

- Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis

### **UNIT V**

**Plant respiration:**Respiration, glycolysis, fermentation (anaerobic).

#### **Plant growth and development**

- Phases and rate of plant growth, Condition of growth,Introduction to plant growth regulators

**04 Hours**

#### **Cell - The unit of life**

- Structure and functions of cell and cell organelles.Cell division

#### **Tissues**

Definition, types of tissues, location and functions.

#### **Text Books**

1. Text book of Biology by S. B. Gokhale
2. A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.

#### **Reference Books**

1. A Text book of Biology by B.V. Sreenivasa Naidu
2. A Text book of Biology by Naidu and Murthy
3. Botany for Degree students By A.C.Dutta.
4. Outlines of Zoology byM. Ekambaranatha ayyer and T. N. Ananthakrishnan.
5. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

## **BP112RBP.REMEDIAL BIOLOGY (Practical)**

**2 Hours/week**

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

### **Reference Books**

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum .Biology forum of Karnataka. Prof .M.J.H.Shafi

## BP 106 RMT.REMEDIAL MATHEMATICS (Theory)

30 hours

**Scope:** This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, Analytical geometry, Calculus, differential equation and Laplace transform.

**Objectives:** Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

### COURSE CONTENT

#### UNIT – I

##### Partial fraction

Introduction, Polynomial, Rational fractions, Proper and Improper fractions, Partial fraction, Resolving into Partial fraction, Application of Partial Fraction in Chemical Kinetics and Pharmacokinetics.

##### Logarithms

Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.

06 Hours

##### Function:

Real Valued function, Classification of real valued functions

##### Limits and continuity :

Introduction, Limit of a function, Definition of limit of a function ( $\epsilon - \delta$  definition),

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}, \quad \lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1,$$

#### UNIT –II

##### 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 adjugate 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 Respiratory volumes

06 Hours

#### UNIT – III

##### 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

06 Hours

(Quotient formula) – **Without Proof**, Derivative of  $x^n$  w.r.t  $x$ , where  $n$  is any rational number, Derivative of  $e^x$ , Derivative of  $\log_e x$ , 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

#### UNIT – IV

##### 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

**06 Hours**

##### **Integration:**

Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application

#### UNIT-V

**Differential Equations** : Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations**

**06 Hours**

**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 Books (Latest Edition)**

1. Differential Calculus by Shanthinarayan
2. Pharmaceutical Mathematics with application to Pharmacy by Panchaksharappa Gowda D.H.
3. Integral Calculus by Shanthinarayan
4. Higher Engineering Mathematics by Dr.B.S.Grewal