

## **Semester I**

## BP101T. HUMAN ANATOMY AND PHYSIOLOGY-I (Theory)

45 Hours

### Course Content:

#### Unit-I

10 hours

**Introduction to human body:** Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

**Cellular level of organization:** Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent; b) Paracrine; c) Synaptic; d) Endocrine.

**Tissue level of organization:** Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

#### Unit-II

10 hours

**Integumentary system:** Structure and functions of skin.

**Skeletal system:** 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.

**Joints:** Structural and functional classification, types of joints movements and its articulation.

#### Unit-III

10 hours

**Body fluids and blood:** Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo-endothelial system.

**Lymphatic system:** Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system.

#### Unit-IV

08 hours

**Peripheral nervous system:** Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.

**Special senses:** Structure and functions of eye, ear, nose and tongue and their disorders.

#### Unit-V

07 hours

##### Cardiovascular system

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.

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

**4 Hours/weeks**

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 Books (Latest Editions)**

- Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York.
- Physiological Basis of Medical Practice by Best and Taylor, Williams & Wilkins Co, Riverview, MI, USA.
- Textbook of Medical Physiology by Arthur C, Guyton and John, E. Hall, Miamisburg, Ohio, U.S.A.
- Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
- Human Anatomy and Physiology by Marieb E.N., Benjamin Cummings, Pearson Education Inc., San Francisco.
- Preventive and Social Medicine by Park K., Banarsidas Bhanot Publishers, Jabalpur.
- Anatomy and Physiology in Health and Illness by Ross & Wilson Churchill Livingstone, London.
- Essentials of Anatomy and Physiology by Seeley R.R., Stephens T.D. and Tate P. McGraw-Hill, New York.
- Health Education and Community Pharmacy by Parmar N.S., CBS Publishers, Delhi.
- Health Education and Community Pharmacy by Dandiya P.C., Zafer Z.Y.K., and Zafer A. Vallabh Prakashan, Delhi.
- Samson Wright's Applied Physiology by Keele C.A., Niel E. and Joels N., Oxford University Press, New York.
- Human Physiology - Volume 1 and 2 by Dr. C.C. Chatterjee, Academic Publishers, Kolkata.

**BP102T. PHARMACEUTICAL ANALYSIS (Theory) 45 Hours**

**Course Content:**

**Unit-I**

**10 Hours**

**Pharmaceutical analysis:** Definition and scope.

- i) Different techniques of analysis.
- ii) Methods of expressing concentration.
- iii) Primary and secondary standards.
- iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate.

**Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures.

Pharmacopoeia, Sources of impurities in medicinal agents, limit tests.

**Unit-II**

**10 Hours**

**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.

**Non-aqueous titration:** Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl.

**Unit-III**

**10 Hours**

**Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajan's method, estimation of sodium chloride.

**Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.

**Gravimetry:** Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.

Basic Principles, methods and application of diazotization titration.

**Unit-IV**

**08 Hours**

**Redox titrations:** Concepts of oxidation and reduction, Types of redox titrations (Principles and applications).

Cerimetry, Iodimetry, Iodometry, Bromometry, Dichrometry and titration with potassium-iodate.

**Unit-V****07 Hours****Electrochemical methods of analysis:****Conductometry-** Introduction, Conductivity cell, Conductometric titrations, applications.**Potentiometry-** Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.**Polarography** - Principle, Ilkovic equation construction and working of dropping mercury electrode and rotating platinum electrode, applications.

## BP108P. PHARMACEUTICAL ANALYSIS (Practical)

4 Hours / Week

### I Limit Test of the following:

- (1) Chloride.
- (2) Sulphate.
- (3) Iron.
- (4) Arsenic.

### II Preparation and standardization of

- (1) Sodium hydroxide.
- (2) Sulphuric acid.
- (3) Sodium thiosulfate.
- (4) Potassium permanganate.
- (5) Ceric ammonium sulphate.

### III Assay of the following compounds along with Standardization of Titrant:

- (1) Ammonium chloride by acid base titration.
- (2) Ferrous sulphate by Cerimetry.
- (3) Copper sulphate by Iodometry.
- (4) Calcium gluconate by Complexometry.
- (5) Hydrogen peroxide by Permanganatometry.
- (6) Sodium benzoate by non-aqueous titration.
- (7) Sodium Chloride by precipitation titration.

### IV Determination of Normality by electro-analytical methods:

- (1) Conductometric titration 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.

### Recommended Books: (Latest Editions)

- Vogel's Textbook of Quantitative Chemical Analysis by Mendham J., Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., Pearson Education Asia.
- A Textbook of Pharmaceutical by Connors K.A., Wiley Inter-science.
- Practical Pharmaceutical Chemistry by Beckett A.H., and Stenlake J.B., Vol. I & II. Athlone Press, University of London.
- British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
- Quantitative Analysis by Alexeyev V., CBS Publishers & Distributors, New Delhi.
- The Pharmacopoeia of India, the Controller of Publications, Delhi.
- Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, New Delhi.
- Analytical Chemistry Principles by John H. Kennedy, Cengage Learning, Delhi.

## BP103T. PHARMACEUTICS-I (Theory)

45 Hours

### 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, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.

**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, allegation, 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)

3 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) Terpen Hydrate Linctus IP'66.
  - b) Iodine Throat Paint (Mandl's Paint).
- 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) Aluminum Hydroxide gel.
- 6. Emulsions**
  - a) Turpentine Liniment.
  - b) Liquid paraffin emulsion.
- 7. Powders and Granules**
  - a) ORS powder (WHO).
  - b) Effervescent granules.
  - c) Dusting powder.
  - d) Divided powders.
- 8. Suppositories**
  - a) Glycero -Gelatin suppository.
  - b) Cocoa butter suppository.
  - c) Zinc Oxide suppository.
- 9. Semisolids**
  - a) Sulphur ointment.
  - b) Non staining-iodine ointment with methyl salicylate.
  - c) Carbopol gel.
- 10. Gargles and Mouthwashes**
  - a) Iodine gargle.
  - b) Chlorhexidine mouthwash.



**Recommended Books: (Latest Editions)**

- Pharmaceutical Dosage Form and Drug Delivery System by H.C. Ansel et al., Lippincott Williams and Wilkins, New Delhi.
- Cooper and Gunn's Dispensing for Pharmaceutical Students by Carter S.J., CBS Publishers, New Delhi.
- A Practical Guide to Contemporary Pharmacy Practice by Judith E. Thompson, 1<sup>st</sup> ed., Lippincott Williams & Wilkins.
- Pharmaceutics, The Science & Dosage Form Design by M.E. Aulton, Churchill Livingstone, Edinburgh.
- Pharmacopoeia of India, The Controller of Publications, Delhi.
- British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
- United States Pharmacopoeia (National Formulary).
- Theory and Practice of Industrial Pharmacy by Lachman, Lea & Febiger Publisher, the University of Michigan.
- Remington. The Science and Practice of Pharmacy by Alfonso R. Gennaro, Lippincott Williams and Wilkins, New Delhi.
- Cooper and Gunn's Tutorial Pharmacy by Carter S.J., CBS Publications, New Delhi.
- Bentley's Textbook of Pharmaceutics by E.A. Rawlins, English Language Book Society, Elsevier Health Sciences, USA.
- Pharmaceutical Palletization Technology by Isaac Ghebre Sellassie, Marcel Dekker Inc., New York.
- Handbook of Pharmaceutical Granulation Technology, Marcel Dekker Inc., New York.
- Pharmaceutical Emulsions and Suspensions, Francoise Nieloud and Gilberte Marti-Mestres Marcel Dekker, INC, New York.
- Textbook of Pharmaceutics, Volume - I & II by Aulton M.E., Churchill Livingstone, London.
- Modern Dispensing Pharmacy by Jain N.K., 2<sup>nd</sup> Ed, PharmaMed Press, Hyderabad.
- Calculations for Pharmaceutical Practice by A. Winfiled and I. Edafiogho, Elsevier Churchill Livingstone, London.
- Elementary Pharmaceutical Calculations by Tripathi D.K., PharmaMed Press, Hyderabad.

## BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

45 Hours

### Course Content:

#### Unit-I

10 Hours

**Impurities in pharmaceutical Substances:** 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.

**General methods of preparation,** assay for the compounds superscripted with asterisk (\*), properties and medicinal uses of inorganic compounds belonging to the following classes.

#### Unit-II

10 Hours

**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.

**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.

**Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

#### Unit-III

10 Hours

##### 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 Kaolin and Bentonite.

**Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations.

#### Unit-IV

08 Hours

##### Miscellaneous compounds

**Expectorants:** Potassium iodide, Ammonium chloride\*.

**Emetics:** Copper sulphate\*, Sodium potassium tartrate.

**Hematinics:** Ferrous sulphate\*, Ferrous gluconate.

**Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite<sup>333</sup>.

**Astringents:** Zinc Sulphate, Potash Alum.

#### Unit-V

07 Hours

**Radiopharmaceuticals:** Radio activity, measurement of radioactivity, properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, half-life, radio isotopes and study of radio isotopes- Sodium iodide  $I^{131}$ , storage conditions, precautions & pharmaceutical application of radioactive substances.

## **BP110P. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)**

**4 Hours / Week**

### **I Limit tests for following ions**

Limit test for Chlorides and Sulphates  
Modified limit test for Chlorides and Sulphates  
Limit test for Iron  
Limit test for Heavy metals  
Limit test for Lead  
Limit test for Arsenic

### **II Identification test**

Magnesium hydroxide  
Ferrous sulphate  
Sodium bicarbonate  
Calcium gluconate  
Copper sulphate

### **III Test for purity**

Swelling power of Bentonite  
Neutralizing capacity of aluminum hydroxide gel  
Determination of potassium iodate and iodine in potassium Iodide

### **IV Preparation of inorganic pharmaceuticals**

Boric acid  
Potash alum  
Ferrous sulphate

### **Recommended Books (Latest Editions)**

- Pharmacopoeia of India, the Controller of Publications, Delhi.
- British Pharmacopoeia, Her Majesty's Stationary Office, University Press, Cambridge.
- United States Pharmacopoeia (National Formulary).
- Inorganic, Medicinal & Pharmaceutical Chemistry by Block J.H., Roche E., Soine, T. and Wilson, C., Lea & Febiger, Philadelphia.
- Bentley and Driver's Textbook of Pharmaceutical Chemistry by Atherden L.M., Oxford University Press, London.
- Inorganic Chemistry by Miessler, G.L. and Tarr, D.A., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), New Delhi.
- Vogel's Qualitative Inorganic Analysis by Svehla, G. and Sivasankar, B. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), New Delhi.

- Pharmaceutical Inorganic Chemistry by Rao K.S. and Suresh C.V., PharmaMed Press, Hyderabad.
- Pharmaceutical Inorganic Chemistry: Theory and Practice by Chenchu Lakshmi, N.V., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), New Delhi.
- Bentley and Driver's Textbook of Pharmaceutical Chemistry, Oxford University Press, New Delhi.
- Inorganic Pharmaceutical Chemistry by M.L. Schroff, National Book Centre, Kolkata.

## BP105T. COMMUNICATION SKILLS (Theory)

30 Hours

### Course content:

#### Unit-I

07 Hours

**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.

**Perspectives in communication:** Introduction, Visual perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

#### Unit-II

07 Hours

**Elements of communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

**Communication styles:** Introduction, The Communication Styles Matrix with example for each Direct communication style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.

#### Unit-III

07 Hours

**Basic listening skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in difficult situations.

**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, Organization of the Message.

#### Unit-IV

05 Hours

**Interview skills:** Purpose of an interview, Do's and Don'ts of an interview.

**Giving presentations:** Dealing with Fears, planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery.

#### Unit-V

04 Hours

**Group discussion:** Introduction, Communication skills in group discussion, Do's and Don'ts of group discussion.

## **BP111P. COMMUNICATION SKILLS (Practical)**

**2 Hours / Week**

### **Course content:**

The following learning modules are to be conducted using words worth<sup>®</sup> English language lab software.

#### **Basic communication covering the following topics**

Meeting People.  
Asking Questions.  
Making Friends.  
What did you do?  
Do's and Don'ts.

#### **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)**

- Basic Communication Skills for Technology, Andreja. J. Ruther Ford, 2<sup>nd</sup> Edition, Pearson Education, 2011.
- Communication Skills, Sanjay Kumar, Pushpalata, 1<sup>st</sup> Edition, Oxford Press, 2011.
- Organizational Behavior, Stephen P. Robbins, 1<sup>st</sup> Edition, Pearson, 2013.
- Brilliant- Communication Skills, Gill Hasson, 1<sup>st</sup> Edition, Pearson Life, 2011.
- The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5<sup>th</sup> Edition, Pearson, 2013.
- Developing Your Influencing Skills, Deborah Dalley, Lois Burton, Margaret, Green hall,

- 1st Edition Universe of Learning Ltd., 2010.
- Communication Skills for Professionals, Konar Nira, 2<sup>nd</sup> Edition, New arrivals, PHI, 2011.
  - Personality Development and Soft Skills, Barun K Mitra, 1<sup>st</sup> Edition, Oxford Press, 2011.
  - Soft Skill for Everyone, Butter Field, 1<sup>st</sup> Edition, Cengage Learning India Pvt. Ltd., 2011.
  - Soft Skills and Professional Communication, Francis Peters S.J., 1<sup>st</sup> Edition, McGraw Hill Education, 2011.
  - Effective Communication, John Adair, 4<sup>th</sup> Edition, Pan MacMillan, 2009.
  - Bringing Out the Best in People, Aubrey Daniels, 2<sup>nd</sup> Edition, McGraw Hill, 1999.

**BP106RBT. REMEDIAL BIOLOGY (Theory)**

30 Hours

**Course content:**

**Unit-I**

07 Hours

**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, Protista, Fungi, Animalia and Plantae, Virus.

**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 & Dicotyledons.

**Unit-II**

07 Hours

**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.

**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**

07 Hours

**Excretory products and their elimination:** Modes of excretion, Human excretory system-structure and function, Urine formation, Rennin 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**

05 Hours

**Plants and mineral nutrition:** Essential mineral, macro and micronutrients, Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

**Photosynthesis:** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

**Unit-V**

04 Hours

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

**Plant growth and development:** Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators

**Cell - The unit of life:** Structure and functions of cell and cell organelles. Cell division

**Tissues:** Definition, types of tissues, location and functions.



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

**30 Hours**

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.

### **Textbooks:**

- Textbook of Biology by S. B. Gokhale.
- A Textbook of Biology by Dr. Thulajappa and Dr. Seetaram.

### **Reference Books:**

- A Textbook of Biology by B.V. Sreenivasa Naidu.
- A Textbook of Biology by Naidu and Murthy.
- Botany for Degree Students by A.C. Dutta.
- Outlines of Zoology by M. Ekambaranatha Ayyer and T.N. Ananthkrishnan.
- A Manual for Pharmaceutical Biology Practical by S.B. Gokhale and C.K. Kokate.

### **Recommended Books (Latest Edition):**

- Practical Human Anatomy and Physiology by S.R. Kale and R.R. Kale.
- A Manual of Pharmaceutical Biology Practical by S.B. Gokhale, C.K. Kokate and S.P. Shrivastava.
- Biology Practical Manual According to National Core Curriculum Biology Forum of Karnataka by Prof. M.J.H. Shafi.

## BP106RMT. REMEDIAL MATHEMATICS (Theory)

30 Hours

### Course Content:

#### Unit-I

06 Hours

**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.

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

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

#### Unit-II

06 Hours

##### 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.

#### Unit-III

06 Hours

**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  $x^n$  w.r.t.x, where  $n$  is any rational number, Derivative of  $e^x$ , Derivative of  $\log_e x$ , Derivative of  $a^x$ , 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****06 Hours****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.**Unit-V****06 Hours****Differential Equations:** Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, Application in solving Pharmacokinetic equations.**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)**

- Differential Calculus by Shanthinarayan.
- Pharmaceutical Mathematics with Application to Pharmacy by Panchaksharappa Gowda D.H.
- Integral Calculus by Shanthinarayan.
- Higher Engineering Mathematics by Dr. B.S. Grewal.