EVALUATION SCHEME & SYLLABUS

BACHELOR OF PHARMACY
# Bachelor of Pharmacy (B. Pharm.)
## COURSE OF STUDY & SCHEME OF EVALUATION FOR INTERNAL AND END SEMESTER EXAMINATIONS
### (W.E.F. Session 2019-20)
### FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Name of the Course</th>
<th>No. of Hours/ week</th>
<th>Continuous Mode</th>
<th>Internal Assessment</th>
<th>End Semester Exams</th>
<th>Total Marks</th>
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<td>BP101T</td>
<td>Human Anatomy and Physiology– Theory</td>
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<td>BP102T</td>
<td>Pharmaceutical Analysis I – Theory</td>
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<td>BP103T</td>
<td>Pharmaceutics I – Theory</td>
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<td>BP104T</td>
<td>Pharmaceutical Inorganic Chemistry– Theory</td>
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<td>BP106RBT</td>
<td>Remedial Biology/ Mathematics – Theory</td>
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<td>Human Anatomy and Physiology – Practical</td>
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<td>BP108P</td>
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<td>BP109P</td>
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<td>4 Hrs</td>
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<td>BP110P</td>
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<td>4 Hrs</td>
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<td>BP111P</td>
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<td>BP112RBP</td>
<td>Remedial Biology– Practical</td>
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<td>2 Hrs</td>
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Total: 38\(^{f}\)/40\(^{f}\) 110\(^{f}\)/120\(^{f}\) 175\(^{f}\)/190\(^{f}\) 26\(^{f}\)/28\(^{f}\) Hrs 285\(^{f}\)/310\(^{f}\) 440\(^{f}\) 28\(^{f}\) Hrs 725\(^{f}\)/750\(^{f}\) 29\(^{f}\)/30\(^{f}\)

\(^{f}\)Applicable only for students who have studied Mathematics/ Physics/ Chemistry at HSC and appearing for Remedial Biology (RB) course.

\(^{g}\)Applicable only for the students who have studied Physics/ Chemistry/ Botany/ Zoology at HSC and appearing for Remedial Mathematics (RM) course.
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.


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.
10. Determination of clotting time.
11. Estimation of hemoglobin content.
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
15. Recording of blood pressure.

Recommended Books (Latest Editions)

- Physiological Basis of Medical Practice by Best and Tailor, 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.
- Health Education and Community Pharmacy by Parmar N.S., CBS Publishers, Delhi.
- 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.

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)

- A Textbook of Pharmaceutical by Conners K.A., Wiley Inter-science.
- The Pharmacopoeia of India, the Controller of Publications, 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.


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


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 dosages 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) Glycerol -Gelatin suppository.
   b) Coca 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.
- Pharmacopoeia of India, The Controller of Publications, Delhi.
- Theory and Practice of Industrial Pharmacy by Lachman, Lea & Febiger Publisher, the University of Michigan.
- 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 Emulsions and Suspensions, Francoise Nieloud and Gilberte Marti-Mestres Marcel Dekker, INC, New York.
- Elementary Pharmaceutical Calculations by Tripathi D.K., PharmaMed Press, Hyderabad.
BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)  

Course Content:  
45 Hours  

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.  


Unit-IV  

8 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 nitrite333.  

Astringents: Zinc Sulphate, Potash Alum.  

Unit-V  

7 Hours  

Radiopharmaceuticals: 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.
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.
- Vogel's Qualitative Inorganic Analysis by Svehla, G. and Sivasankar, B. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 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
Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.

Unit-II  07 Hours
Elements of communication: Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

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)

Course content:

The following learning modules are to be conducted using words worth® 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)**
- Developing Your Influencing Skills, Deborah Dalley, Lois Burton, Margaret, Green hall,


BP106RBT. REMEDIAL BIOLOGY (Theory)
30 Hours

Course content: 07 Hours

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, 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

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

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

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


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

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.
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.
7. Determination of blood group.
8. Determination of blood pressure.

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. Ananthakrishnan.

Recommended Books (Latest Edition):
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 \((\varepsilon - \delta)\) definition), \(\lim_{x \to a} \frac{x - a}{x - a} = na^{n-1}\), \(\lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1\), \(x \to a \quad 0 \to 0\)

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:** Introduction, 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.