NIRMA UNIVERSITY

NAAC ACCREDITED 'A' GRADE

NU/AC/300317/IP/BP/TES_Sylb/Sem-I/17- 77
Date: 20 .05.2017

NOTIFICATION

Read:
1. **Regulation No. 44 of Academic Regulations for Admission to University, etc. published vide notification No. NU-442 dated 27.1.2004- Empowering Academic Council to approve teaching & examination scheme, syllabus, etc**
2. **Notifications mentioned in Handbook-IV, updated up to April, 2015**
3. **Resolution No. 3 - Faculty of Pharmacy Meeting –02.03.2017**
4. **Resolution No. 4(A)(ii) - Academic Council Meeting – 30.03.2017**

Sub: **Introduction of Teaching & Examination Scheme and Syllabus of Semester-I of B.Pharm. programme**

It is, hereby, notified for information of all concerned that, the Academic Council in its meeting held on 30.03.2017 under resolution No. 4(A)(ii); in exercise of powers conferred upon it by the Board of Governors under regulation mentioned at serial 1 above, taking into consideration the recommendation of Faculty of Pharmacy, has resolved to approve the Teaching & Examination Scheme and Syllabus of **Semester-I** of **B.Pharm. programme as prescribed by PCI**, to be made effective for the students to be admitted from academic year 2017-18 and onwards as per ***Appendix*-A** attached herewith.

Executive Registrar (i/c)

Encl.: Appendix – A [Pages 1 to 18]

To,
1. Dean, Faculty of Pharmacy
2. All Heads of Academic Area Committee (IP)
3. Dy. Registrar (Examination)

Copy to: OS- IP/IS, Librarian-IP, P.A. to ER

c.f.w.cs. for information to:
1. Vice President
2. Director General
3. Director (A&GA)

Nirma University
Institute of Pharmacy
Teaching & Examination Scheme of *(B.Pharm)*

Semester - I

Sr. No.	Course Code	Course Title	Teaching Scheme				Examination Scheme				
							Duration		Component Weightage		
			L	LPW/PW	T	C	SEE	LPW/PW	CE	LPW/PW	SEE
1	BP101T	Human Anatomy and Physiology I– Theory	3	-	1	4	3.0	-	0.25	-	0.75
2	BP102T	Pharmaceutical Analysis I – Theory	3	-	1	4	3.0	-	0.25	-	0.75
3	BP103T	Pharmaceutics - I Theory	3	-	1	4	3.0	-	0.25	-	0.75
4	BP104T	Pharmaceutical Inorganic Chemistry – Theory	3	-	1	4	3.0	-	0.25	-	0.75
5	BP105T	Communication Skills- Theory*	2	-	-	2	-	-	1.00	-	-
6	BP106RBT / BP106RMT	Remedial Biology / Remedial Mathematics- Theory*	2	-	-	2	-	-	1.00	-	-
7	BP107P	Human Anatomy and Physiology – Practical	-	4	-	2	-	4	0.30	0.70	-
8	BP108P	Pharmaceutical Analysis I – Practical	-	4	-	2	-	4	0.30	0.70	-
9	BP109P	Pharmaceutics - I Practical	-	4	-	2	-	4	0.30	0.70	-
10	BP110P	Pharmaceutical Inorganic Chemistry – Practical	-	4	-	2	-	4	0.30	0.70	-
11	BP111P	Communication Skills- Practical*	-	2	-	1	-	2	-	1.00	-
12	BP112RBP	Remedial Biology - Practical*	-	2	-	1	-	2	-	1.00	-
		Total	**14/16#$**	**18/18$/20#**	**4**	**27/29$/30#**					
			32/34$/36#								

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

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

* Non University Examination (NUE)

L: *Lectures, P/T: Practicals/Tutorial, C: Credits*

LPW: *Laboratory / Project Work*

SEE: *Semester End Examination*

CE: *Continuous Evaluation*

Appendix-A (Noti. No. NU-037 Acad-30-2017)

w.e.f. academic year 2017-2018 and onwards

NIRMA UNIVERSITY
Institute of Pharmacy

(B. Pharm)
(Semester - I)

L	T	P	C
3	1	-	4

Course Code	BP101T
Course Title	Human Anatomy and Physiology I– Theory

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

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

Syllabus: **Teaching hours: 45 Hours**

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**

- **Nervous system**
  Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. Structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

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

- **Endocrine system**

  Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

Suggested Readings^: (Latest Edition)

1. Sembulingam, K. Sembulingam, P. Essentials of Medical Physiology. New Delhi, Jaypee Brother's Medical Publishers.
2. Wilson, K.J.W. Anatomy and Physiology in Health and Illness. New York, Churchill Livingstone.
3. Best and Tailor. Physiological basis of Medical Practice. MI USA, Williams & Wilkins Co, Riverview.
4. Guyton, A.C, Hall J.E, Miamisburg, O.H. Text book of Medical Physiology. U.S.A. Elseveir Saunders.
5. Tortora G, Palmetto, G.A. Principles of Anatomy and Physiology. U.S.A. John Wiley & sons.
6. Singh I. Textbook of Human Histology. New Delhi, Jaypee Brother's Medical Publishers.
7. Ghai, C.L. Textbook of Practical Physiology. New Delhi. Jaypee Brother's Medical Publishers.
8. Srinageswari, K., Sharma, R. Practical workbook of Human Physiology. New Delhi, Jaypee Brother's Medical Publishers.
9. Chatterrje, C.C. Human Physiology (vol 1 and 2). Kolkata, Academic Publishers

L= Lecture, T= Tutorial, P= Practical, C= Credit

^ this is not an exhaustive list

(B.Pharm)
(Semester- I)

L	T	P	C
3	1	-	4

Course Code	**BP102T**
Course Title	**Pharmaceutical Analysis I – Theory**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Understand the principles of volumetric and electro chemical analysis
2. Carryout various volumetric and electrochemical titrations
3. Develop analytical skills

Syllabus: **Teaching hours: 45 Hours**

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, Fajans 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 diazotisation titration.

UNIT-IV **08 Hours**

- **Redox titrations**
  - (a) Concepts of oxidation and reduction
  - (b) Types of redox titrations (Principles and applications)
  - Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, 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

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

Suggested Readings^: (Latest edition)

1. Beckett, A. H., & Stenlake, J. B. (Eds.). Practical Pharmaceutical Chemistry: Part I & II. A&C Black.
2. Mendham, J. Vogel's textbook of quantitative chemical analysis. Pearson Education India.
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry. Vallabh Publications.
4. Driver, J. E. Bentley & Driver's text-book of pharmaceutical chemistry. London.
5. Kennedy, J. H. Analytical Chemistry: Principles. Harcourt School.
6. Indian Pharmacopoeia

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^ this is not an exhaustive list

(B. Pharm.)
(Semester - I)

L	T	P	C
3	1	-	4

Course Code	**BP103T**
Course Title	**Pharmaceutics I - Theory**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Know the history of profession of pharmacy
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
3. Understand the professional way of handling the prescription
4. Preparation of various conventional dosage forms

Syllabus: **Teaching hours: 45 Hours**

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, 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.

UNIV – 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 semisolid dosage forms. Evaluation of semisolid dosages forms.

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

Suggested Readings^: (Latest edition)

1. Loyd, V.A., Nicholas, .P., & Ansel, H.C. Ansels's Pharmaceutical Dosage Form and Drug Delivery Systems. Lippincott Williams and Walkins.
2. Cooper J.W., Gunn, C, & Cater, S. J. Dispensing for Pharmaceutical Students. Edinburgh; London: Churchill Livingstone.
3. Aulton, M.E. Pharmaceutics: The Science & Dosage Form Design. Edinburh; London: Churchill Livingstone.
4. Indian pharmacopoeia, Indian Pharmacopoeial Commission.
5. British pharmacopoeia, British Pharmacopoeial Commission.
6. Leon Lachmann, & Herbert, A.L. The Theory and Practice of Industrial Pharmacy. New. Delhi: CBS Publishers & Distributors Pvt. Ltd.
7. Remington, J. P., & Gennaro, A. R. Remington: The Science and Practice of Pharmacy. Lippincott Williams,
8. Cooper J.W., Gunn, C, & Cater, S. J. Cooper and Gunn's Tutorial Pharmacy. New Delhi: CBS Publishers.
9. Bentley, A.O., & Rawlins, E.A. Bentley's Text Book of Pharmaceutics. USA: Elsevier Health Sciences.

10. Isaac Ghebre Sellassie. Pharmaceutical Pelletization Technology. New York: Marcel Dekker.
11. Parikh, D.M. Handbook of Pharmaceutical Granulation Technology. New York: Informa Healthcare.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions. New York: Informa Healthcare, cop.

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(B. Pharm)
(Semester - I)

L	T	P	C
3	1	-	4

Course Code	BP104T
Course Title	Pharmaceutical Inorganic Chemistry – Theory

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

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

Syllabus: **Teaching hours: 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

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 tartarate

Haematinics: Ferrous sulphate*, Ferrous gluconate

Poison and Antidote: Sodium thiosulphate*, Activated charcoal, Sodium nitrite333

Astringents: Zinc sulphate, Potash alum

UNIT V **07 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.

Tutorials **Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

Suggested Readings^: (Latest edition)

1. Beckett, A. H., & Stenlake, J. B. (Eds.). Practical Pharmaceutical Chemistry: Part II (Vol. 1 & 2). A&C Black.
2. Vogel, A. I. A Text-book of Quantitative inorganic analysis: including elementary instrumental analysis. London: Longmans.
3. Rao, P. G. Inorganic Pharmaceutical Chemistry. Vallabh Prakashan.
4. Schroff, M. L. *Pharmaceutical chemistry*. Calcutta: National Book Centre.
5. Bentley, A., Driver, J., & Atherden, L. Bentley and Driver's textbook of pharmaceutical chemistry. Oxford: Oxford University Press.
6. Chatwal, G. R. Pharmaceutical Chemistry: Inorganic, Volume I. Himalaya Pub. House.
7. Indian Pharmacopoeia, Indian Pharmacopoeia Commission

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^ this is not an exhaustive list

(B. Pharm)
(Semester - I)

L	T	P	C
2	-	-	2

Course Code	**BP105T**
Course Title	**Communication Skills - Theory**

Course Learning Outcomes (CLO):

At the end of the course, students will 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

Syllabus: **Teaching hours: 30 Hours**

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

Suggested Readings^: (Latest Edition)

1. RutherFord, A.J. Basic communication skills for Technology, Pearson Education.
2. Pushpalata, S.K. Communication skills. Oxford Press.
3. Robbins, S.P. Organizational Behaviour. Pearson.
4. Hasson, G. Brilliant - Communication skills. Pearson Life.
5. Gopalaswamy, R. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success. Pearson.
6. Dalley, D., Burton, M. & Greenhall, M. Developing your Influencing Skills. Universe of Learning Ltd.
7. Konar, N. Communication Skills for Professionals, PHI.
8. Mitra, B.K. Personality Development and Soft Skills. Oxford Press.
9. Butterfield. Soft Skill for Everyone. Cengage Learning India Pvt. Ltd
10. Peters, F.S.J. Soft Skills and Professional Communication. Mc Graw Hill Education.
11. Adair, J. Effective Communication. Pan Mac Millan.
12. Daniels, A. Bringing Out the Best in People. Mc Graw Hill.

L= Lecture, T= Tutorial, P= Practical, C= Credit

^ this is not an exhaustive list

(B. Pharm)
(Semester - I)

L	T	P	C
2	--	--	2

Course Code	**BP106RBT**
Course Title	**Remedial Biology – Theory**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. Know the classification and salient features of five kingdoms of life
2. Understand the basic components of anatomy & physiology of plant
3. Know and understand the basic components of anatomy & physiology of animal with special reference to human

Syllabus: **Teaching hours: 30 Hours**

UNIT I **7 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.

Suggested Readings^: (Latest edition)

1. Gokhale, S.B. Text book of Pharmaceutical Biology, Pragati Books.
2. Thulajappa, S. A. & Seetaram. A Text book of Biology.
3. Naidu, S.B.V. A Text book of Biology.
4. Naidu, M. A. & Murthy. Text book of Biology.
5. Dutta, A.C. Botany for Degree students. Oxford University Press.
6. Ayyer, M.E. & Ananthakrishnan T.N. A Manual of Zoology.
7. Gokhale, S.B. & Kokate, C.K.. A Manual for Pharmaceutical Biology Practical. Nirali Prakashan.

L= Lecture, T= Tutorial, P= Practical, C= Credit

^ this is not an exhaustive list

(B. Pharm)
(Semester - I)

L	T	P	C
2	-	-	2

Course Code	**BP106RMT**
Course Title	**Remedial Mathematics – Theory**

Course Learning Outcomes (CLO):

At the end of the course, students will 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

Syllabus: **Teaching hours: 30 Hours**

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 (ε - δ definition)

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

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**

Suggested Readings^: (Latest edition)

1. Narayan, S. Differential Calculus. S. Chand Publishers.
2. Panchaksharappa Gowda, D.H. Pharmaceutical Mathematics with application to Pharmacy. PharmaMed Press.
3. Narayan, S., & Mittal, P. K. Integral calculus. S. Chand Publishers.
4. Grewal, B. S. Higher Engineering Mathematics

L= Lecture, T= Tutorial, P= Practical, C= Credit
^ this is not an exhaustive list

(B. Pharm)
(Semester - I)

L	T	P	C
-	-	4	2

Course Code	BP107P
Course Title	Human Anatomy and Physiology – Practical

Syllabus: Total Hours: 60 Hours

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. To study the integumentary and special senses using specimen, models, etc.,
7. To study the nervous system using specimen, models, etc.,
8. To study the endocrine system using specimen, models, etc
9. To demonstrate the general neurological examination
10. To demonstrate the function of olfactory nerve
11. To examine the different types of taste.
12. To demonstrate the visual acuity
13. To demonstrate the reflex activity
14. Recording of body temperature
15. To demonstrate positive and negative feedback mechanism.

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(B.Pharm)
(Semester- I)

L	T	P	C
-	-	4	2

Course Code	BP108P
Course Title	Pharmaceutical Analysis I – Practical

Syllabus: Total hours: 60 Hours

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 Permanganometry
- (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

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(B. Pharm.)
(Semester - I)

L	T	P	C
-	-	4	2

Course Code	**BP109P**
Course Title	**Pharmaceutics I - Practical**

Syllabus: Total hours: 60 Hours

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

a) Calamine lotion
b) Magnesium Hydroxide mixture
c) Aluminimum 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)Divded powders

8. Suppositories

a) Glycero gelatin suppository
b) Coca butter suppository
c) Zinc Oxide suppository

9. Semisolids

a) Sulphur ointment
b) Non staining-iodine ointment with methyl salicylate c) Carbopal gel

10. Gargles and Mouthwashes

a) Iodine gargle
b) Chlorhexidine mouthwash

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(B. Pharm)
(Semester-I)

L	T	P	C
-	-	4	2

Course Code	**BP110P**
Course Title	**Pharmaceutical Inorganic Chemistry – Practical**

Syllabus: **Total hours: 60 Hours**

1. 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

2. Identification test

Magnesium hydroxide
Ferrous sulphate
Sodium bicarbonate
Calcium gluconate
Copper sulphate

3. Test for purity

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

4. **Preparation of inorganic pharmaceuticals**
   Boric acid
   Potash alum
   Ferrous sulphate

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(B. Pharm)
(Semester - I)

L	T	P	C
-	-	2	1

Course Code	BP111P
Course Title	Communication Skills - Practical

Syllabus: **Total hours: 30 Hours**

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

1. **Basic communication covering the following topics**
   Meeting People
   Asking Questions
   Making Friends
   What did you do?
   Do's and Don'ts
2. **Pronunciations covering the following topics**
   Pronunciation (Consonant Sounds)
   Pronunciation and Nouns
   Pronunciation (Vowel Sounds)
3. **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

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(B. Pharm)
(Semester-I)

L	T	P	C
--	--	2	1

Course Code	BP112RBP
Course Title	Remedial Biology - Practical

Syllabus: **Total hours: 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

Suggested Readings^: (Latest edition)

1. Kale, S.R. & Kale, R.R. Practical Human Anatomy and Physiology
2. Gokhale, S.B. Kokate, C.K. & Shriwastava S.P. A Manual of Pharmaceutical Biology Practical
3. Shafi, M.J.H. Biology Practical Manual according to National Core Curriculum. Biology Forum of Karnataka.

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