GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Effective for F. Y. B. Pharm from Academic Year 2022-2023

B. Pharm 1st Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP101T	Human Anatomy and Physiology I	Compulsory	3	1	4	75	25	100
BP102T	Pharmaceutical Analysis I	Compulsory	3	1	4	75	25	100
BP103T	Pharmaceutics I	Compulsory	3	1	4	75	25	100
BP104T	Pharmaceutical Inorganic Chemistry	Compulsory	3	1	4	75	25	100
BP105T	Communication Skills*	Compulsory	2	0	2	35	15	50
BP106RBT/ BP107RMT	Remedial Biology*/ Remedial Mathematics*	Compulsory	2	0	2	35	15	50
BP107P	Human Anatomy and Physiology I	Compulsory	4	0	2	25	75	100
BP108P	Pharmaceutical Analysis I	Compulsory	4	0	2	25	75	100
BP109P	Pharmaceutics I	Compulsory	4	0	2	25	75	100
BP110P	Pharmaceutical Inorganic Chemistry	Compulsory	4	0	2	25	75	100
BP111P	Communication Skills*	Compulsory	2	0	1	15	35	50
BP112RBP	Remedial Biology*	Compulsory	2	0	1	15	35	50
Total			**32/34$/36#**	**4**	**27/29$/30#**			

* L=lectures, P=Practical, E= External, I= Internal,

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

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

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Subject Code BP101T
Semester: I
Subject Name: HUMAN ANATOMY AND PHYSIOLOGY-I

45Hours

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 humanbody.
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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory (T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Unit No.	Topics	Hours
1	**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 signalling pathway activation by extracellular signal molecule, Forms of intracellular signalling: 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.	10

2	**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	**10**
3	**Body fluids and blood** Body fluids, composition and functions of blood, hemopoeisis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system. **Lymphatic system** Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system	**10**
4	**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.	**8**
5	**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.	**7**

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypeebrothers' medical publishers, New Delhi.

2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, ChurchillLivingstone, New York

3. Physiological basis of Medical Practice-Best and Tailor. Williams & WilkinsCo, Riverview, MI USA

4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH,U.S.A.

5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

6. Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers,New Delhi.

7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers,New Delhi.

8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma,Jaypee brother's medical publishers, New Delhi.

Reference Books (Latest Editions)

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview, MI USA

2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH,U.S.A.

3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Subject Code BP102T
SEMESTER: I
Subject Name: PHARMACEUTICAL ANALYSIS I

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 student shall be able to

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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory(T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	**Pharmaceutical analysis**- Definition and scope a) Different techniques of analysis b) Methods of expressing concentration c) Primary and secondary standards. d) 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.	**10**
2	**Acid base titration**: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, andvery weak acids and bases, neutralization curves	**10**

	Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	
3	**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.	**10**
4	**Redox titrations** a) Concepts of oxidation and reduction b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration withpotassium iodate	**8**
5	**Electrochemical methods of analysis** **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications. **Potentiometry -** Electrochemical cell, construction and workingof 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	**7**

Recommended Books: (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry
4. Bentley and Driver's Textbook of Pharmaceutical Chemistry
5. John H. Kennedy, Analytical chemistry principles
6. Indian Pharmacopoeia.

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Subject Code BP103T
SEMESTER: I
Subject Name: PHARMACEUTICS-I

45 Hours

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:

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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory(T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	**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.	**10**

2	**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	**10**
3	**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.	**10**
4	**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	**8**
5	**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	**7**

Recommended Books: (Latest Editions)

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. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Subject Code BP104T
SEMESTER: I
Subject Name: Pharmaceutical Inorganic Chemistry

45 Hours

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

Objectives: Upon completion of course, student shall 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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory(T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	**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	**10**
2	**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	**10**

	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.	
3	**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	**10**
4	**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	**8**
5	**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	**7**

Recommended Books (Latest Editions)

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II,Stahlone Press of University of London, 4th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

SEMESTER: I

Subject Code: BP105T	**Subject Title:** Communication Skills -Theory
Pre-requisite Subject	**- NONE -**

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 theareas 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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory(T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
2	NA	NA	2	35	15	50*

***means Non-University Examination (NUE).** The subject expert at college level shall conduct examinations.

Course content:

Sr No	Topics	Hours
1	**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	7

2	**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	**7**
3	**Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming anActive 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	**7**
4	**Interview Skills:** Purpose of an interview, Do's and Dont's of an interview **Giving Presentations:** Dealing with Fears, planning your Presentation, Structuring YourPresentation, Delivering Your Presentation, Techniques of Delivery	**5**
5	**Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion	**4**

Recommended Books: (Latest Edition)

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

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

SEMESTER: I

Subject Code: BP106RBT	**Subject Title:** REMEDIAL BIOLOGY -Theory
Pre-requisite Subject	**- NONE -**

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

Objectives: Upon completion of the course, the student shall 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 understand the basic components of anatomy & physiology animal withspecial reference to human

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Theory(T)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Theory
2	NA	NA	2	35	15	50*

***means Non-University Examination (NUE).** The subject expert at college level shall conduct examinations.

Course Content:

Sr No	Topics	Hours
1	**Living world:** a) Definition and characters of living organisms b) Diversity in the living world c) Binomial nomenclature d) Five kingdoms of life and basis of classification. Salient features of Monera,Potista, 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 & Dicotylidones.	7
2	**Body fluids and circulation** a) Composition of blood, blood groups, coagulation of blood	7

	b) Composition and functions of lymph c) Human circulatory system d) Structure of human heart and blood vessels e) Cardiac cycle, cardiac output and ECG **Digestion and Absorption** a) Human alimentary canal and digestive glands b) Role of digestive enzymes c) Digestion, absorption and assimilation of digested food **Breathing and respiration** a) Human respiratory system b) Mechanism of breathing and its regulation c) Exchange of gases, transport of gases and regulation of respiration d) Respiratory volumes	
3	**Excretory products and their elimination** a) Modes of excretion b) Human excretory system- structure and function c) Urine formation d) Rennin angiotensin system **Neural control and coordination** a) Definition and classification of nervous system b) Structure of a neuron c) Generation and conduction of nerve impulse d) Structure of brain and spinal cord e) Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata **Chemical coordination and regulation** a) Endocrine glands and their secretions b) Functions of hormones secreted by endocrine glands **Human reproduction** a) Parts of female reproductive system b) Parts of male reproductive system c) Spermatogenesis and Oogenesis d) Menstrual cycle	**7**
4	**Plants and mineral nutrition:** a) Essential mineral, macro and micronutrients b) Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation **Photosynthesis** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affectingphotosynthesis	**5**
5	**Plant respiration:** Respiration, glycolysis, fermentation (anaerobic). **Plant growth and development** Phases and rate of plant growth, Condition of growth, Introduction to plant growthregulators **Cell - The unit of life** Structure and functions of cell and cell organelles. Cell division **Tissues** Definition, types of tissues, location and functions.	**4**

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 by M. Ekambaranatha ayyer and T. N. Ananthakrishnan.

e. A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

SEMESTER: I

Subject Code: BP106 RMT	**Subject Title:** REMEDIAL MATHEMATICS - Theory
Pre-requisite Subject	**- NONE -**

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

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**		
				Theory(T)		**Total Marks**
Lecture	**Tutorial**	**Practical**	**Credit**	**End semester exams**	**Internal Assessment**	**Theory**
2	NA	NA	2	35	15	50*

***means Non-University Examination (NUE).** The subject expert at college level shall conduct examinations.

Course Content:

Unit No.	**Topics**	**Hours**
1	**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~~ ($\in$ - δ definition), $\lim x^n - a^n = na^{n-1}$ $\lim \frac{\sin\theta}{\theta} = 1$	**6**

	$x \to a$ $x - a$ $\theta \to 0$ θ	
2	**Matrices and Determinant:** Introduction matrices, Types of matrices, Operation on matrices, Transpose of a matrix, Matrix Multiplication, Determinants, Properties of determinants , Product of determinants, Minors and co-Factors, Adjoint or 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,Applicationof Matrices in solving Pharmacokinetic equations	**6**
3	**Calculus** **Differentiation** : Introductions, Derivative of a function, Derivative of a constant, Derivative of a product of a constant and a function , Derivativeof the sum or difference of two functions, Derivative of the product of twofunctions (product formula), Derivative of the quotient of two functions(Quotient formula) – **Without Proof**, Derivative of x^n *w.r.t*x,where *n* is anyrational number, Derivative of e^x,, Derivative of $\log_e x$, Derivative ofa^x,Derivative of trigonometric functions from first principles **(without Proof)**, Successive Differentiation, Conditions for a function to be amaximum or a minimum at a point. Application	**6**
4	**Analytical Geometry** **Introduction:** Signs of the Coordinates, Distance formula, **Straight Line:** Slope or gradient of a straight line, Conditions for parallelism perpendicularity of two lines, Slope of a line joining two points, Slope – intercept form of a straight line **Integration:** Introduction, Definition, Standard formulae, Rules of integration, Method of substitution, Method of Partial fractions, Integration by parts, definite integrals, application	**6**
5	**Differential Equations:** Some basic definitions, Order and degree, Equations in separable form, Homogeneous equations, Linear Differential equations, Exact equations, **Application in solving Pharmacokinetic equations** **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**	**6**

Recommended Books (Latest Edition)

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

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: I

Subject Code: BP107P	**Subject Title:** Human Anatomy and Physiology -Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**		
				Practical(P)		**Total Marks**
Lecture	**Tutorial**	**Practical**	**Credit**	**End semester exams**	**Internal Assessment**	**Practical**
NA	NA	4	2	75	25	100

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.

- **List of experiments (4 hours/week)**

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.

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: I

Subject Code: BP108P	**Subject Title:** PHARMACEUTICAL ANALYSIS I -Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Practical(P)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Practical
NA	NA	4	2	75	25	100

1. **Limit Test of the following**
   a) Chloride
   b) Sulphate
   c) Iron
   d) Arsenic

2. **Preparation and standardization of**
   a) Sodium hydroxide
   b) Sulphuric acid
   c) Sodium thiosulfate
   d) Potassium permanganate
   e) Ceric ammonium sulphate
3. **Assay of the following compounds along with Standardization of Titrant**
   a) Ammonium chloride by acid base titration
   b) Ferrous sulphate by Cerimetry
   c) Copper sulphate by Iodometry
   d) Calcium gluconate by complexometry
   e) Hydrogen peroxide by Permanganometry
   f) Sodium benzoate by non-aqueous titration
   g) Sodium Chloride by precipitation titration
4. **Determination of Normality by electro-analytical methods**
   a) Conductometric titration of strong acid against strong base
   b) Conductometric titration of strong acid and weak acid against strong base
   c) Potentiometric titration of strong acid against strong base

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: I

Subject Code: BP109P	**Subject Title:** Pharmaceutics I - Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Practical(P)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Practical
---	----	4	2	75	25	100

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

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

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: I

Subject Code: BP110P	**Subject Title:** Pharmaceutical Inorganic Chemistry - Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Practical(P)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Practical
NA	NA	4	2	75	25	100

List of Experiments: (4 Hours / Week)

I) Limit tests for following ions

1. Limit test for Chlorides and Sulphates
2. Modified limit test for Chlorides and Sulphates
3. Limit test for Iron
4. Limit test for Heavy metals
5. Limit test for Lead
6. Limit test for Arsenic

II) Identification test

1. Magnesium hydroxide
2. Ferrous sulphate
3. Sodium bicarbonate
4. Calcium gluconate
5. Copper sulphate

III) Test for purity

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

IV) Preparation of inorganic pharmaceuticals

1. Boric acid
2. Potash alum
3. Ferrous sulphate

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: I

Subject Code: BP111P	**Subject Title:** Communication Skills - Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Practical(P)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Practical
NA	NA	2	1	35	15	50*

***means Non University Examination (NUE).** The subject expert at college level shall conduct examinations.

COMMUNICATION SKILLS (2 hours/ week)

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

1. **Basic communication covering the following topics**

   Meeting People

   Asking Questions

   Making Friends

   What did you do?

   Do's and Dont's

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

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: I

Subject Code: BP112RBP	**Subject Title:** Remedial Biology -Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
				Practical(P)		Total Marks
Lecture	Tutorial	Practical	Credit	End semester exams	Internal Assessment	Practical
NA	NA	2	1	35	15	50*

***means Non-University Examination (NUE).** The subject expert at college level shall conduct examinations.

List of Experiments: (2 hours/week, Total: 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

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

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

B. Pharm 2nd Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP201T	Human Anatomy and Physiology II	Compulsory	3	1	4	75	25	100
BP202T	Pharmaceutical Organic Chemistry I	Compulsory	3	1	4	75	25	100
BP203T	Pharmaceutical Engineering	Compulsory	3	1	4	75	25	100
BP204T	Computer Applications in Pharmacy*	Compulsory	3	0	3	35	15	50
BP205T	Environmental Sciences*	Compulsory	3	0	3	35	15	50
BP206P	Human Anatomy and Physiology II	Compulsory	4	0	2	75	25	100
BP207P	Pharmaceutical Organic Chemistry I	Compulsory	4	0	2	75	25	100
BP208P	Pharmaceutical Engineering	Compulsory	4	0	2	75	25	100
BP209P	Computer Applications in Pharmacy*	Compulsory	2	0	1	35	15	50
Total			**28**	**3**	**25**			

* L=lectures, P=Practical, E= External, I= Internal,

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP201T

Semester: II

Subject Name: Human Anatomy and Physiology-II

45 Hours

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 hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time etc. and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)		
Lecture	Tutorial	Credit	Theory (T)		Total Marks
			End semester exams	Internal Assessment	Theory
3	1	4	75	25	100

Course Content:

Sr. No.	Topics	Hours
1	**Nervous system** Organization of nervous system, neuron, neuroglia, classification and properties of nerve fiber, electrophysiology, 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)	**10**
2	**Digestive system**	**7**

	Anatomy of GI Tract with special reference to anatomy and functions of stomach, (Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT. **Energetics** Formation and role of ATP, Creatinine Phosphate and BMR	
3	**Respiratory System** Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods. **Urinary system** Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.	**10**
4	**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.	**10**
5	**Reproductive system** Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition **Introduction to genetics** Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance	**8**

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers' medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers' medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers' medical publishers, NewDelhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma,

Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP202T

Semester: II

Subject Name: Pharmaceutical Organic Chemistry-I

45 Hours

Scope: This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

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

1. Write the structure, name and the type of isomerism of the organic compound
2. Write the reaction, name the reaction and orientation of reactions
3. Account for reactivity/stability of compounds,
4. Identify/confirm the identification of organic compound

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)		
			Theory (T)		Total Marks
Lecture	Tutorial	Credit	End semester exams	Internal Assessment	Theory
3	1	4	75	25	100

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to beexplained

To emphasize on definition, types, classification, principles/mechanisms, applications, examplesand differences

Sr. No.	Topics	Hours
1	**Classification, nomenclature and isomerism** Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds(up to 10 Carbons open chain and carbocyclic compounds) Structural isomerisms in organic compounds	7
2	**Alkanes*, Alkenes* and Conjugated dienes*** SP^3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP^2 hybridization in alkenes	10

	E_1 and E_2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E_1 verses E_2 reactions, Factors affecting E_1 and E_2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement	
3	**Alkyl halides*** SN_1 and SN_2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry andrearrangement of carbocations. SN_1 versus SN_2 reactions, Factors affecting SN_1 and SN_2 reactions Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene,dichloromethane, tetrachloromethane and iodoform. **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	**10**
4	**Carbonyl compounds* (Aldehydes and ketones)** Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.	**10**
5	**Carboxylic acids*** Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid **Aliphatic amines*** - Basicity, effect of substituent on Basicity. Qualitative test, Structure anduses of Ethanolamine, Ethylenediamine, Amphetamine	**8**

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP203T

Semester: II

Subject Name: Pharmaceutical Engineering

45 Hours

Scope: This course is designed to impart a fundamental knowledge on the art and scienceof various unit operations used in pharmaceutical industry.

Objectives: Upon completion of the course student shall be able:

1. To know various unit operations used in Pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimumuse of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)		
			Theory (T)		Total Marks
Lecture	Tutorial	Credit	End semester exams	Internal Assessment	Theory
3	1	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	**Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturi meter, Pitot tube and Rotameter. **Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill. **Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Airseparator, Bag filter & elutriation tank.	**10**
2	**Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.	**10**

	Evaporation: Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator& Economy of multiple effect evaporator. **Distillation:** Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation	
3	**Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer. **Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demeritsof Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,	**10**
4	**Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter. **Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.	**8**
5	**Materials of pharmaceutical plant construction, Corrosion and its prevention:** Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and their prevention. Ferrous and nonferrous metals, inorganic and organic nonmetals, basic of material handling systems.	**7**

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson-Latest edition.
3. Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latestedition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
   Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: II

45 Hours

Subject Code: BP209P	**Subject Title:** Computer Applications in Pharmacy (Practical)
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)		**Evaluation Scheme (Marks)**		
Practical	**Credit**	**Practical(P)**		**Total Marks**
		End semester exams	**Internal Assessment**	**Practical**
2	1	35	15	50

Computer Applications in Pharmacy (Practical)

2 Hours / Week

1. Design a questionnaire using a word processing package to gather informationabout a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard, generating label in MS WORD
5. Create a database in MS Access to store the patient information with the requiredfields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record inthe database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server,DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP205T

Semester: II

Subject Name: ENVIRONMENTAL SCIENCES

30 hours

Scope: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

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

1. Create the awareness about environmental problems among learners.
2. Impart basic knowledge about the environment and its allied problems.
3. Develop an attitude of concern for the environment.
4. Motivate learner to participate in environment protection and environment improvement.
5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
6. Strive to attain harmony with Nature.

Teaching Scheme (Hours per week)			Evaluation Scheme (Marks)		
Lecture	Tutorial	Credit	Theory (T)		Total Marks
			End semester exams	Internal Assessment	Theory
3	0	3	35	15	50

Course Content:

Sr. No	Topics	Hours
1	The Multidisciplinary nature of environmental studiesNatural Resources Renewable and non-renewable resources: Natural resources and associated problems Forest resources; b) Water resources; c) Mineral resources; d) Food	10

	resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources	
2	Ecosystems Concept of an ecosystem. Structure and function of an ecosystem. Introduction, types, characteristic features, structure and function ofthe ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	**10**
3	Environmental Pollution: Air pollution; Water pollution; Soil pollution	**10**

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers,Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd.,Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E Hepworth, M.T. 2001,Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: II

45 Hours

Subject Code: BP206P	**Subject Title:** Human Anatomy and Physiology -Practical
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)		**Evaluation Scheme (Marks)**		
Practical	**Credit**	**Practical(P)**		**Total Marks**
		End semester exams	**Internal Assessment**	**Practical**
4	2	75	25	100

Human Anatomy and Physiology-II (practical)

4 Hours/ Week

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

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc.
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual activity.
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index .

14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

Recommended Books (Latest Editions)

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers' medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers' medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers' medical publishers, NewDelhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

Reference Books:

1. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
2. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
3. Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje, Academic Publishers Kolkata

GOKUL GLOBAL UNIVERSITY
RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy
Semester: II

45 Hours

Subject Code: BP207P	**Subject Title:** Pharmaceutical Organic Chemistry-I (Practical)
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)		**Evaluation Scheme (Marks)**		
Practical	**Credit**	**Practical(P)**		**Total Marks**
		End semester exams	**Internal Assessment**	**Practical**
4	2	75	25	100

Pharmaceutical Organic Chemistry-I (Practical)

4 Hours / Week

1. Systematic qualitative analysis of unknown organic compounds like
   a) Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
   b) Detection of elements like Nitrogen, Sulphur and Halogen byLassaigne's test
   c) Solubility test
   d) Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
   e) Melting point/Boiling point of organic compounds
   f) Identification of the unknown compound from the literature usingmelting point/ boiling point.
   g) Preparation of the derivatives and confirmation of the unknowncompound by melting point/ boiling point.
   h) Minimum 5 unknown organic compounds to be analysed systematically.
2. Preparation of suitable solid derivatives from organic compounds
3. Construction of molecular models

Recommended Books (Latest Editions)

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.

6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwaliah/Chatwal.

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: II

45 Hours

Subject Code: BP208P	**Subject Title:** Pharmaceutical Engineering (Practical)
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)		**Evaluation Scheme (Marks)**		
Practical	**Credit**	**Practical(P)**		**Total Marks**
		End semester exams	**Internal Assessment**	**Practical**
4	2	75	25	100

Pharmaceutical Engineering (Practical)

4 Hours / Week

1. Determination of radiation constant of brass, iron, unpainted and painted glass.
2. Steam distillation – To calculate the efficiency of steam distillation.
3. To determine the overall heat transfer coefficient by heat exchanger.
4. Construction of drying curves (for calcium carbonate and starch).
5. Determination of moisture content and loss on drying.
6. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
7. Description of Construction working and application of Pharmaceutical Machinery such as rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
8. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of varioussize frequency curves including arithmetic and logarithmic probability plots.
9. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
10. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
11. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentrationand Thickness/ viscosity
12. To study the effect of time on the Rate of Crystallization.
13. To calculate the uniformity Index for given sample by using Double ConeBlender.

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson-

Latest edition.
3. Unit operation of chemical engineering – Mcabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latestedition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition.
Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition

GOKUL GLOBAL UNIVERSITY

RECOGNIZED UNDER SECTION 2(f) & 22 OF UGC ACT 1956

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: II

45 Hours

Subject Code: BP209P	**Subject Title:** Computer Applications in Pharmacy (Practical)
Pre-requisite Subject	**- NONE -**

Teaching Scheme (Hours per week)		**Evaluation Scheme (Marks)**		
Practical	**Credit**	**Practical(P)**		**Total Marks**
		End semester exams	**Internal Assessment**	**Practical**
2	1	35	15	50

Computer Applications in Pharmacy (Practical)

2 Hours / Week

1. Design a questionnaire using a word processing package to gather informationabout a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard, generating label in MS WORD
5. Create a database in MS Access to store the patient information with the requiredfields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record inthe database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

Recommended books (Latest edition):

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server,DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002