



Gokul Pharmacy College

B. Pharm

Bachelor of Pharmacy (B. Pharm)
Batch 2022-23
Program Outcomes (PO)



Students of all undergraduate pharmacy degree programs at the time of graduation will be able to learn:

PO1: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and administrative pharmacy sciences; and manufacturing practices.

PO2: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO3: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.

PO4: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy related computing tools with an understanding of the limitations

PO5: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and teambuilding when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO6: Professional Identity: Understand, analyse and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO7 : Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Pharmacy practice.

PO9: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO10: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO11: Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



Gokul Pharmacy College

B. Pharm

Bachelor of Pharmacy (B. Pharm)
Batch 2022-23
Program Specific Outcomes
(PSO)



Students after the completion of graduation in degree pharmacy programs able to:

PSO1: Drugs and Diseases: Sound knowledge of different classes of drugs, their mechanism of action, dynamics, kinetics, structure activity relationships, pathophysiology and pharmacotherapeutics of various diseases.

PSO2: Drug Development: High competency in to synthesizing, developing, analyzing and/or evaluating various pharmaceuticals and their formulations.

PSO3: Professional competency: Innovative and having aptitude for research, effective communicator, strong leadership and entrepreneur ability in order to embellish true professional identity.

PSO4: Well-rounded education: Ethical on code of conduct, culturally competent and responsible citizen and true exhibitor of their role of pharmacist in the community.



GOKUL GLOBAL UNIVERSITY

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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/ BP106RMT	Remedial Biology*/ Remedial Mathematics*	Compulsory	2	0	2	35	15	50
BP107P	Human Anatomy and Physiology I	Compulsory	4	0	2	75	25	100
BP108P	Pharmaceutical Analysis I	Compulsory	4	0	2	75	25	100
BP109P	Pharmaceutics I	Compulsory	4	0	2	75	25	100
BP110P	Pharmaceutical Inorganic Chemistry	Compulsory	4	0	2	75	25	100
BP111P	Communication Skills*	Compulsory	2	0	1	35	15	50
BP112RBP	Remedial Biology*	Compulsory	2	0	1	35	15	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.



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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			

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Gokul Pharmacy College

B. Pharm 3rd Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP301T	Pharmaceutical Organic Chemistry II	Compulsory	3	1	4	75	25	100
BP302T	Physical Pharmaceutics I	Compulsory	3	1	4	75	25	100
BP303T	Biochemistry	Compulsory	3	1	4	75	25	100
BP304T	Pathophysiology	Compulsory	3	1	4	75	25	100
BP305T	Pharmacognosy and Phytochemistry I	Compulsory	3	1	4	75	25	100
BP306P	Pharmaceutical Organic Chemistry II	Compulsory	4	0	2	75	25	100
BP307P	Physical Pharmaceutics I	Compulsory	4	0	2	75	25	100
BP308P	Biochemistry	Compulsory	4	0	2	75	25	100
BP309P	Pharmacognosy and Phytochemistry I	Compulsory	4	0	2	75	25	100
Total			31	5	28			

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Gokul Pharmacy College

B. Pharm 4th Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP401T	Pharmaceutical Organic Chemistry III	Compulsory	3	1	4	75	25	100
BP402T	Medicinal Chemistry I	Compulsory	3	1	4	75	25	100
BP403T	Physical Pharmaceutics II	Compulsory	3	1	4	75	25	100
BP404T	Pharmacology I	Compulsory	3	1	4	75	25	100
BP405T	Pharmaceutical Jurisprudence	Compulsory	3	1	4	75	25	100
BP406P	Medicinal Chemistry I	Compulsory	4	0	2	75	25	100
BP407P	Physical Pharmaceutics II	Compulsory	4	0	2	75	25	100
BP408P	Pharmacology I	Compulsory	4	0	2	75	25	100
Total			27	5	26			

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Gokul Pharmacy College

B. Pharm 5th Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP501T	Medicinal Chemistry II	Compulsory	3	1	4	75	25	100
BP502T	Pharmacology II	Compulsory	3	1	4	75	25	100
BP503T	Pharmacognosy and Phytochemistry II	Compulsory	3	1	4	75	25	100
BP504T	Pharmaceutical Microbiology	Compulsory	3	1	4	75	25	100
BP505T	Pharmaceutical Biotechnology	Compulsory	3	1	4	75	25	100
BP506P	Pharmacology II	Compulsory	4	0	2	75	25	100
BP507P	Pharmacognosy and Phytochemistry II	Compulsory	4	0	2	75	25	100
BP508P	Pharmaceutical Microbiology	Compulsory	4	0	2	75	25	100
Total			27	5	26			

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Gokul Pharmacy College

B. Pharm 6th Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP601T	Medicinal Chemistry III	Compulsory	3	1	4	75	25	100
BP602T	Pharmacology III	Compulsory	3	1	4	75	25	100
BP603T	Herbal Drug Technology	Compulsory	3	1	4	75	25	100
BP604T	Biopharmaceutics and Pharmacokinetics	Compulsory	3	1	4	75	25	100
BP605T	Industrial Pharmacy I	Compulsory	3	1	4	75	25	100
BP606P	Medicinal Chemistry III	Compulsory	4	0	2	75	25	100
BP607P	Pharmacology III	Compulsory	4	0	2	75	25	100
BP608P	Herbal Drug Technology	Compulsory	4	0	2	75	25	100
BP609P	Industrial Pharmacy I	Compulsory	4	0	2	75	25	100
Total			31	5	28			

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Gokul Pharmacy College

B. Pharm 7th Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP701T	Instrumental Methods of Analysis	Compulsory	3	1	4	75	25	100
BP702T	Industrial Pharmacy II	Compulsory	3	1	4	75	25	100
BP703T	Pharmacy Practice	Compulsory	3	1	4	75	25	100
BP704T	Novel Drug Delivery System	Compulsory	3	1	4	75	25	100
BP705T	Quality Assurance	Compulsory	3	1	4	75	25	100
BP706P	Instrumental Methods of Analysis	Compulsory	4	0	2	75	25	100
BP707P	Practice School	Compulsory	12	0	6	100	-	100
Total			31	5	28			

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Gokul Pharmacy College
B. Pharm 8th Semester
TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP801T	Biostatistics and Research Methodology	Compulsory	3	1	4	75	25	100
BP802T	Social and Preventive Pharmacy	Compulsory	3	1	4	75	25	100
BP803T	Pharmacovigilance	Elective I	3	1	4	75	25	100
BP804T	Quality Control and standardization of Herbals	Elective I	3	1	4	75	25	100
BP805T	Cosmetic Science	Elective I	3	1	4	75	25	100
BP806T	Experimental Pharmacology	Elective I	3	1	4	75	25	100
BP807T	Pharmaceutical Product Development	Elective I	3	1	4	75	25	100
BP808T	Epidemiology	Elective I	3	1	4	75	25	100
BP809T	Pharma Marketing Management	Elective II	3	1	4	75	25	100
BP810T	Pharmaceutical Regulatory science	Elective II	3	1	4	75	25	100
BP811T	Computer Aided Drug Design	Elective II	3	1	4	75	25	100
BP812T	Cell and Molecular Biology	Elective II	3	1	4	75	25	100
BP813T	Advanced Instrumentation Techniques	Elective II	3	1	4	75	25	100
BP814T	Dietary Supplements and Nutraceuticals	Elective II	3	1	4	75	25	100
BP815P	Project Work	Compulsory	12	0	6	100	50	150
Total			24*	4*	22*			

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Note*: It is compulsory for all Students can select one subject from Elective-I and one subject from Elective-II.



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Gokul Pharmacy College

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B. Pharm 1st Semester

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BP104T	Pharmaceutical Inorganic Chemistry	Compulsory	3	1	4	75	25	100
BP105T	Communication Skills*	Compulsory	2	0	2	35	15	50
BP106RBT/ BP106RMT	Remedial Biology*/ Remedial Mathematics*	Compulsory	2	0	2	35	15	50
BP107P	Human Anatomy and Physiology I	Compulsory	4	0	2	75	25	100
BP108P	Pharmaceutical Analysis I	Compulsory	4	0	2	75	25	100
BP109P	Pharmaceutics I	Compulsory	4	0	2	75	25	100
BP110P	Pharmaceutical Inorganic Chemistry	Compulsory	4	0	2	75	25	100
BP111P	Communication Skills*	Compulsory	2	0	1	35	15	50
BP112RBP	Remedial Biology*	Compulsory	2	0	1	35	15	50
Total			32/34^{\$}/36[#]	4	27/29^{\$}/30[#]			

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



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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)		
Lecture	Tutorial	Practical	Credit	Theory (T)		Total Marks
				End semester exams	Internal Assessment	
3	1	NA	4	75	25	100

Course Content:

Unit No.	Topics	Hours
1	<p>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.</p> <p>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</p> <p>Tissue level of organization Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.</p>	10

2	<p>Integumentary system Structure and functions of skin</p> <p>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</p> <p>Joints Structural and functional classification, types of joints movements and its articulation</p>	10
3	<p>Body fluids and blood Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.</p> <p>Lymphatic system Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system</p>	10
4	<p>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.</p> <p>Special senses Structure and functions of eye, ear, nose and tongue and their disorders.</p>	8
5	<p>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.</p>	7

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 Taylor. Williams & Wilkins Co, Riverview, MI USA
4. Text book of Medical Physiology- Arthur C, Guyton and John.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



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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)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

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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, and very weak acids and bases, neutralization curves	10

	Non aqueous titration: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	
3	<p>Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride.</p> <p>Complexometric titration: Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate.</p> <p>Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate.</p> <p>Basic Principles, methods and application of diazotisation titration.</p>	10
4	<p>Redox titrations</p> <p>a) Concepts of oxidation and reduction</p> <p>b) Types of redox titrations (Principles and applications)</p> <p>Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate</p>	8
5	<p>Electrochemical methods of analysis</p> <p>Conductometry- Introduction, Conductivity cell, Conductometric titrations, applications.</p> <p>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.</p> <p>Polarography - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications</p>	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.



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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 and pharmaceutical 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)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	<p>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.</p> <p>Dosage forms: Introduction to dosage forms, classification and definitions</p> <p>Prescription: Definition, Parts of prescription, handling of Prescription and Errors in prescription.</p> <p>Posology: Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.</p>	10

2	<p>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.</p> <p>Powders: Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions.</p> <p>Liquid dosage forms: Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques</p>	10
3	<p>Monophasic liquids: Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions.</p> <p>Biphasic liquids:</p> <p>Suspensions: Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome.</p> <p>Emulsions: Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.</p>	10
4	<p>Suppositories: Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.</p> <p>Pharmaceutical incompatibilities: Definition, classification, physical, chemical and therapeutic incompatibilities with examples</p>	8
5	<p>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</p>	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. Françoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.



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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)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				End semester exams	Internal Assessment	Theory
3	1	NA	4	75	25	100

Course Content:

Sr No	Topics	Hours
1	<p>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</p> <p>General methods of preparation, assay for the compounds superscripted with asterisk (*), properties and medicinal uses of inorganic compounds belonging to the following classes</p>	10
2	<p>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.</p> <p>Major extra and intracellular electrolytes: Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium</p>	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 nitrite 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

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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 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

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				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 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	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 Your Presentation, 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, 1st Edition, Oxford Press, 2011
3. Organizational Behaviour, Stephen.P. Robbins, 1st Edition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1st Edition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5th Edition, 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, 2nd Edition, New arrivals –PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1st Edition, 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, 1st Edition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4th Edition, Pan Mac Millan, 2009
12. Bringing out the best in people, Aubrey Daniels, 2nd Edition, Mc Graw Hill, 1999



GOKUL GLOBAL UNIVERSITY

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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 functional system 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 with special reference to human

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				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	<p>Living world:</p> <p>a) Definition and characters of living organisms</p> <p>b) Diversity in the living world</p> <p>c) Binomial nomenclature</p> <p>d) Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,</p> <p>Morphology of Flowering plants</p> <p>Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones.</p>	7
2	<p>Body fluids and circulation</p> <p>a) Composition of blood, blood groups, coagulation of blood</p>	7

	<ul style="list-style-type: none"> 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 <p>Digestion and Absorption</p> <ul style="list-style-type: none"> a) Human alimentary canal and digestive glands b) Role of digestive enzymes c) Digestion, absorption and assimilation of digested food <p>Breathing and respiration</p> <ul style="list-style-type: none"> 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	<p>Excretory products and their elimination</p> <ul style="list-style-type: none"> a) Modes of excretion b) Human excretory system- structure and function c) Urine formation d) Rennin angiotensin system <p>Neural control and coordination</p> <ul style="list-style-type: none"> 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 <p>Chemical coordination and regulation</p> <ul style="list-style-type: none"> a) Endocrine glands and their secretions b) Functions of hormones secreted by endocrine glands <p>Human reproduction</p> <ul style="list-style-type: none"> a) Parts of female reproductive system b) Parts of male reproductive system c) Spermatogenesis and Oogenesis d) Menstrual cycle 	7
4	<p>Plants and mineral nutrition:</p> <ul style="list-style-type: none"> a) Essential mineral, macro and micronutrients b) Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation <p>Photosynthesis Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis</p>	5
5	<p>Plant respiration: Respiration, glycolysis, fermentation (anaerobic).</p> <p>Plant growth and development Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators</p> <p>Cell - The unit of life Structure and functions of cell and cell organelles. Cell division</p> <p>Tissues Definition, types of tissues, location and functions.</p>	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



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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)		
Lecture	Tutorial	Practical	Credit	Theory(T)		Total Marks
				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	<p>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</p> <p>Logarithms Introduction, Definition, Theorems/Properties of logarithms, Common logarithms, Characteristic and Mantissa, worked examples, application of logarithm to solve pharmaceutical problems.</p> <p>Function: Real Valued function, Classification of real valued functions,</p> <p>Limits and continuity: Introduction, Limit of a function, Definition of limit of a function ($\epsilon - \delta$ definition), $\lim x^n = a^n = na^{n-1}$ $\lim \sin\theta = 1$</p>	6

	$x \rightarrow a$ $x - a$ $0 \rightarrow 0$ Θ	
2	<p>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</p>	6
3	<p>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</p>	6
4	<p>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</p>	6
5	<p>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</p>	6

Recommended Books (Latest Edition)

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



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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				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 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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				End semester exams	Internal Assessment	Practical
NA	NA	4	2	75	25	100

1. Limit Test of the following

- Chloride
- Sulphate
- Iron
- Arsenic

2. Preparation and standardization of

- Sodium hydroxide
- Sulphuric acid
- Sodium thiosulfate
- Potassium permanganate
- Ceric ammonium sulphate

3. Assay of the following compounds along with Standardization of Titrant

- Ammonium chloride by acid base titration
- Ferrous sulphate by Cerimetry
- Copper sulphate by Iodometry
- Calcium gluconate by complexometry
- Hydrogen peroxide by Permanganometry
- Sodium benzoate by non-aqueous titration
- Sodium Chloride by precipitation titration

4. Determination of Normality by electro-analytical methods

- Conductometric titration of strong acid against strong base
- Conductometric titration of strong acid and weak acid against strong base
- Potentiometric titration of strong acid against strong base



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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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				End semester exams	Internal Assessment	Practical
---	----	4	2	75	25	100

PHARMACEUTICS I (Practical, 4 hours/week)

1. Syrups

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

2. Elixirs

- Piperazine citrate elixir
- Paracetamol pediatric elixir

3. Linctus

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

4. Solutions

- Strong solution of ammonium acetate
- Cresol with soap solution
- Lugol's solution

5. Suspensions

- Calamine lotion
- Magnesium Hydroxide mixture
- Aluminium Hydroxide gel

6. Emulsions

- Turpentine Liniment
- Liquid paraffin emulsion

7. Powders and Granules

- ORS powder (WHO)
- Effervescent granules
- Dusting powder
- Divided powders

8. Suppositories

- Glycero gelatin suppository
- Cocoa butter suppository
- Zinc Oxide suppository

9. Semisolids

- Sulphur ointment
- Non staining-iodine ointment with methyl salicylate
- Carbopol gel

10. Gargles and Mouthwashes

- a) Iodine gargle
- b) Chlorhexidine mouthwash



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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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				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



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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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				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



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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)		
Lecture	Tutorial	Practical	Credit	Practical(P)		Total Marks
				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



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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,



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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

	<p>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.</p> <p>Energetics Formation and role of ATP, Creatinine Phosphate and BMR</p>	
3	<p>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.</p> <p>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.</p>	10
4	<p>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.</p>	10
5	<p>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</p> <p>Introduction to genetics Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance</p>	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 and John.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, New Delhi.
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



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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)		
Lecture	Tutorial	Credit	Theory (T)		Total Marks Theory
			End semester exams	Internal Assessment	
3	1	4	75	25	100

Course Content:

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

To emphasize on definition, types, classification, principles/mechanisms, applications, examples and 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 versus 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 and rearrangement 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 and uses 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 Ahluwalia/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 science of 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 optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

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

Course Content:

Sr No	Topics	Hours
1	<p>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.</p> <p>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.</p> <p>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.</p>	10
2	<p>Heat Transfer: Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.</p>	10

	<p>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.</p> <p>Distillation: Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation</p>	
3	<p>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.</p> <p>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 Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,</p>	10
4	<p>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.</p> <p>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.</p>	8
5	<p>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.</p>	7

Recommended Books: (Latest Editions)

1. Introduction to chemical engineering – Walter L Badger & Julius Banchemo, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
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



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP204T

Semester: II

Subject Name: Computer Applications in Pharmacy

30 Hours

Scope: This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

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

1. Know the various types of application of computers in pharmacy
2. Know the various types of databases
3. Know the various applications of databases in pharmacy

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

Course Content:

Unit No.	Topics	Hours
1	Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc., binary addition, binary subtraction – One's complement, Two's complement method, binary multiplication, binary division Concept of Information Systems and Software: Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project	6
2	Web technologies: Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and ServerProducts Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	6
3	Application of computers in Pharmacy – Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System	6
4	Bioinformatics: Introduction, Objective of Bioinformatics, Bioinformatics	6

	Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery	
5	Computers as data analysis in Preclinical development: Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS)	6

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



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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 studies Natural 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 of the 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 Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clarendon 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

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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 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. 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 and John. 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, New Delhi.
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



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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

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

Recommended Books (Latest Editions)

- Organic Chemistry by Morrison and Boyd
- Organic Chemistry by I.L. Finar, Volume-I
- Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
- Organic Chemistry by P.L.Soni
- 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 Ahluwalia/Chatwal.



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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 various size 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, Concentration and 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 Cone Blender.

Recommended Books: (Latest Editions)

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

- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.
 4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
 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



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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 information about 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 required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the 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



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Gokul Pharmacy College

B. Pharm 3rd Semester

TEACHING AND EXAMINATION SCHEME

Sub.code	Subject Name	Category	L/P Hours	Tutorial	Total Credit	E	I	Total Marks
BP301T	Pharmaceutical Organic Chemistry II	Compulsory	3	1	4	75	25	100
BP302T	Physical Pharmaceutics I	Compulsory	3	1	4	75	25	100
BP303T	Biochemistry	Compulsory	3	1	4	75	25	100
BP304T	Pathophysiology	Compulsory	3	1	4	75	25	100
BP305T	Pharmacognosy and Phytochemistry I	Compulsory	3	1	4	75	25	100
BP306P	Pharmaceutical Organic Chemistry II	Compulsory	4	0	2	75	25	100
BP307P	Physical Pharmaceutics I	Compulsory	4	0	2	75	25	100
BP308P	Biochemistry	Compulsory	4	0	2	75	25	100
BP309P	Pharmacognosy and Phytochemistry I	Compulsory	4	0	2	75	25	100
Total			31	5	28			

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

ACT 1956



GOKUL GLOBAL UNIVERSITY

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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP301T

Semester: III

Subject Name: Pharmaceutical Organic Chemistry –II

45 Hours

Scope: This subject deals with general methods of preparation and reactions of some organic compounds. Reactivity of organic compounds are also studied here. The syllabus emphasizes on mechanisms and orientation of reactions. Chemistry of fats and oils are also included in the syllabus.

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. prepare organic compounds

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

Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (*) to be explained.

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

Unit No.	Topics	Hours
1	Benzene and its derivatives A. Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule B. Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation. C. Substituents, effect of substituents on reactivity and orientation of mono	10

Unit No.	Topics	Hours
	substituted benzene compounds towards electrophilic substitution reaction Structure and uses of DDT, Saccharin, BHC and Chloramine	
2	Phenols* - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols Aromatic Amines* - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts Aromatic Acids* –Acidity, effect of substituents on acidity and important reactions of benzoic acid.	10
3	Fats and Oils a. Fatty acids – reactions. b. Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils. c. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value – significance and principle involved in their determination.	10
4	Polynuclear hydrocarbons: a. Synthesis, reactions b. Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives	8
5	Cyclo alkanes* Stabilities – Baeyer’s strain theory, limitation of Baeyer’s strain theory, Coulson and Moffitt’s modification, Sachse Mohr’s theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only	7

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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.



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code: BP302T

Semester: III

Subject Name: Physical Pharmaceutics-I

45 Hours

Scope: The course deals with the various physical and physicochemical properties, and principals involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

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

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

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

Unit No.	Topics	Hours
1	Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications	10
2	States of Matter and properties of matter: State of matter, changes	10

Unit No.	Topics	Hours
	in the state of matter, latent heats, vapor pressure, sublimation critical point, eutectic mixtures, gases, aerosols – inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid- crystalline, amorphous & polymorphism	
3	Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilization, detergency, adsorption at solid interface.	8
4	Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.	8
5	pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.	7

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and Manavalan R.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Pharmacy, by Gaurav Jain & Roop K. Khar



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP303T

Semester: III

Subject Name: Biochemistry

45 Hours

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Objectives: Upon completion of course student shall able to

- Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- Understand the metabolism of nutrient molecules in physiological and pathological conditions.
- Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

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

Course Content:

Unit No.	Topics	Hours
1.	<ul style="list-style-type: none">• Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.• Bioenergetics Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP.	8

Unit No.	Topics	Hours
2.	<ul style="list-style-type: none"> • Carbohydrate metabolism Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus • Biological oxidation Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers 	10
3.	<ul style="list-style-type: none"> • Lipid metabolism β-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity. • Amino acid metabolism General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders. Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alpeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice Catabolism of heme; hyperbilirubinemia and jaundice 	10
4.	<ul style="list-style-type: none"> • Nucleic acid metabolism and genetic information transfer Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors 	10
5	<ul style="list-style-type: none"> • Enzymes Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes 	7

Unit No.	Topics	Hours
	Coenzymes –Structure and biochemical functions.	

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley.



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP304T

Semester: III

Subject Name: Pathophysiology

45 Hours

Scope: Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes. This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Objectives: Upon completion of the subject student shall be able to –

- Describe the etiology and pathogenesis of the selected disease states;
- Name the signs and symptoms of the diseases; and
- Mention the complications of the diseases

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

Course Content:

Unit No.	Topics	Hours
1.	• Basic principles of Cell injury and Adaptation: Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance	10

Unit No.	Topics	Hours
	<ul style="list-style-type: none"> • Basic mechanism involved in the process of inflammation and repair: Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis 	
2.	<ul style="list-style-type: none"> • Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis) • Respiratory system: Asthma, Chronic obstructive airways diseases. • Renal system: Acute and chronic renal failure 	10
3.	<ul style="list-style-type: none"> • Haematological Diseases: Iron deficiency, megaloblastic anaemia (Vit B12 and folic acid), sickle cell anaemia, thalassemia, hereditary acquired anaemia, haemophilia • Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones • Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease. • Gastrointestinal system: Peptic Ulcer 	10
4.	<ul style="list-style-type: none"> • Inflammatory bowel diseases, jaundice, hepatitis (A, B, C, D, E, F) alcoholic liver disease. • Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout • Principles of cancer: classification, etiology and pathogenesis of cancer • Diseases of bones and joints: Rheumatoid Arthritis, Osteoporosis, Gout • Principles of Cancer: Classification, etiology and pathogenesis of Cancer 	8
5	<ul style="list-style-type: none"> • Infectious diseases: Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections • Sexually transmitted diseases: AIDS, Syphilis, Gonorrhoea 	7

Recommended Books (Latest Editions)

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K.; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].
6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John. E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010.

8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP305T

Semester: III

Subject Name: Pharmacognosy and Phytochemistry I

45 Hours

Scope: The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

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

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

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

Course Content:

Unit No.	Topics	Hours
1	Introduction to Pharmacognosy: (a) Definition, history, scope and development of Pharmacognosy (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins). Classification of drugs: Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and serotaxonomical classification of drugs Quality control of Drugs of Natural Origin: Adulteration of drugs of natural origin. Evaluation by organoleptic,	10

Unit No.	Topics	Hours
	microscopic, physical, chemical and biological methods and properties. Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.	
2	Cultivation, Collection, Processing and storage of drugs of natural origin: Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications. Polyploidy, mutation and hybridization with reference to medicinal plants Conservation of medicinal plants	10
3	Plant tissue culture: Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible vaccines	7
4	Pharmacognosy in various systems of medicine: Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine. Introduction to secondary metabolites: Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins	10
5	Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs Plant Products: Fibers - Cotton, Jute, Hemp Hallucinogens, Teratogens, Natural allergens Primary metabolites: General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites: Carbohydrates: Acacia, Agar, Tragacanth, Honey Proteins and Enzymes: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin). Lipids (Waxes, fats, fixed oils): Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax Marine Drugs: Novel medicinal agents from marine sources	8

Recommended Books: (Latest Editions)

- W.C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
- Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and

Febiger, Philadelphia, 1988.

- Text Book of Pharmacognosy by T.E. Wallis
- Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
- Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
- Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
- Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
- Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
- Anatomy of Crude Drugs by M.A. Iyengar



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Gokul Pharmacy College

Bachelor of Pharmacy

Semester: III

Subject Code: BP306P	Subject Title: Pharmaceutical Organic Chemistry –II (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

4 hrs. / week

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III Preparation of compounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline / Phenol / Aniline by acylation reaction.
- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.

- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction
- Cinnamic acid from Benzaldehyde by Perkin reaction
- P-Iodo benzoic acid from P-amino benzoic acid

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.



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Gokul Pharmacy College

Bachelor of Pharmacy

Semester: III

Subject Code: BP307P	Subject Title: Physical Pharmaceutics-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

4 hours / week

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization / Henderson Hassel-batch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl₄ and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.

4. Stocklosam J. Pharmaceutical Calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanyam, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam
10. Test book of Physical Pharmacy, by Gaurav Jain & Roop K. Khar



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Gokul Pharmacy College

Bachelor of Pharmacy

Semester: III

Subject Code: BP308P	Subject Title: Biochemistry (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

4 Hours / Week

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.
4. Biochemistry by D. Satyanarayan and U.Chakrapani

5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf
8. Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11. Practical Biochemistry by Harold Varley



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Gokul Pharmacy College

Bachelor of Pharmacy

Semester: III

Subject Code: BP309P	Subject Title: Pharmacognosy and Phytochemistry 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

4 Hours / Week

- Analysis of crude drugs by chemical tests: (i) Tragacanth (ii) Acacia (iii) Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
- Determination of stomatal number and index
- Determination of vein islet number, vein islet termination and palisade ratio.
- Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer
- Determination of Fiber length and width
- Determination of number of starch grains by Lycopodium spore method
- Determination of Ash value
- Determination of Extractive values of crude drugs
- Determination of moisture content of crude drugs
- Determination of swelling index and foaming

Recommended Books: (Latest Editions)

- W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
- Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
- Text Book of Pharmacognosy by T.E. Wallis
- Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
- Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition,

Nirali Prakashan, New Delhi.

- Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
- Essentials of Pharmacognosy, Dr.SH.Ansari, IInd edition, Birla publications, New Delhi, 2007
- Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
- Anatomy of Crude Drugs by M.A. Iyengar



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP401T

Semester: IV

Subject Name: Pharmaceutical Organic Chemistry – III

45 Hours

Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

Objectives: At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds.

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

Unit No.	Topics	Hours
1	Stereo isomerism Optical isomerism – Optical activity, enantiomerism, diastereoisomerism, meso compounds Elements of symmetry, chiral and achiral molecules DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers Reactions of chiral molecules Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute	10
2	Geometrical isomerism Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems) Methods of determination of configuration of geometrical isomers.	10

Unit No.	Topics	Hours
	Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions	
3	Heterocyclic compounds: Nomenclature and classification Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	10
4	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrazole, Imidazole, Oxazole and Thiazole. Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives	8
5	Reactions of synthetic importance Metal hydride reduction (NaBH_4 and LiAlH_4), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation	7

Recommended Books (Latest Editions)

1. Organic chemistry by I.L. Finar, Volume-I & II.
2. A text book of organic chemistry – Arun Bahl, B.S. Bahl.
3. Heterocyclic Chemistry by Raj K. Bansal
4. Organic Chemistry by Morrison and Boyd
5. Heterocyclic Chemistry by T.L. Gilchr



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Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP402T

Semester: IV

Subject Name: Medicinal Chemistry –I

45 Hours

Scope: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.

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

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs.

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

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted (*)

Unit No.	Topics	Hours
1	Introduction to Medicinal Chemistry History and development of medicinal chemistry Physicochemical properties in relation to biological action Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism. Drug metabolism Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects.	10
2	Drugs acting on Autonomic Nervous System Adrenergic Neurotransmitters: Biosynthesis and catabolism of catecholamine.	10

Unit No.	Topics	Hours
	<p>Adrenergic receptors (Alpha & Beta) and their distribution. Sympathomimetic agents: SAR of Sympathomimetic agents Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyl dopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine. Agents with mixed mechanism: Ephedrine, Metaraminol. Adrenergic Antagonists: Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide. Beta adrenergic blockers: SAR of beta blockers, Propranolol*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.</p>	
3	<p>Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine. Cholinergic receptors (Muscarinic & Nicotinic) and their distribution. Parasympathomimetic agents: SAR of Parasympathomimetic agents Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine. Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isoflurophate, Echothiophate iodide, Parathione, Malathion. Cholinesterase reactivator: Pralidoxime chloride. Cholinergic Blocking agents: SAR of cholinolytic agents Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*. Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride.</p>	10
4	<p>A. Sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturtes: SAR of barbiturates, Barbitol*, Phenobarbital, Mephobarbital, Amobarbital, Butobarbital, Pentobarbital, Secobarbital Miscellaneous: Amides & imides: Glutethimide. Alcohol & their carbamate derivatives: Meproboamate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde. B. Antipsychotics Phenothiazines: SAR of Phenothiazines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride. Ring Analogues of Phenothiazines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine. Fluro buterophenones: Haloperidol, Droperidol, Risperidone. Beta amino ketones: Molindone hydrochloride.</p>	8

Unit No.	Topics	Hours
	<p>Benzamides: Sulpiride.</p> <p>C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action</p> <p>Barbiturates: Phenobarbitone, Methabarbital. Hydantoins: Phenytoin*, Mephenytoin, Ethotoin Oxazolidine diones: Trimethadione, Paramethadione Succinimides: Phensuximide, Methsuximide, Ethosuximide* Urea and monoacylureas: Phenacemide, Carbamazepine* Benzodiazepines: Clonazepam</p> <p>Miscellaneous: Primidone, Valproic acid, Gabapentin, Felbamate</p>	
5	<p>Drugs acting on Central Nervous System</p> <p>General anesthetics:</p> <p>Inhalation anesthetics: Halothane*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.</p> <p>Ultra-short acting barbiturates: Methohexital sodium*, Thiamylal sodium, Thiopental sodium.</p> <p>Dissociative anesthetics: Ketamine hydrochloride. *</p> <p>Narcotic and non-narcotic analgesics</p> <p>Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anilerdine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate*, Methadone hydrochloride*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.</p> <p>Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.</p> <p>Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.</p>	7

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.



GOKUL GLOBAL UNIVERSITY

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

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code: BP403T

Semester: IV

Subject Name: Physical Pharmaceutics-II

45 Hours

Scope: The course deals with the various physical and physicochemical properties, and principals involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

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

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

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

Course Content:

Unit No.	Topics	Hours
1	Colloidal dispersions: Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.	7
2	Rheology: Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers Deformation of solids: Plastic and elastic deformation, Heckle equation, Stress, Strain, Elastic Modulus	10

Unit No.	Topics	Hours
3	Coarse dispersion: Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.	10
4	Micromeritics: Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.	8
5	Drug stability: Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention	7

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1,2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.



GOKUL GLOBAL UNIVERSITY

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

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP404T

Semester: IV

Subject Name: Pharmacology-I

45 Hours.

Scope: The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

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

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences.

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

Course Content:

Unit No.	Topics	Hours
1	General Pharmacology a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists (competitive and noncompetitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs. Enzyme induction, enzyme inhibition, kinetics of elimination	8
2	General Pharmacology a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein-	12

Unit No.	Topics	Hours
	<p>coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action.</p> <p>b. Adverse drug reactions.</p> <p>c. Drug interactions (pharmacokinetic and pharmacodynamic)</p> <p>d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.</p>	
3	<p>Pharmacology of drugs acting on peripheral nervous system</p> <p>c. Organization and function of ANS.</p> <p>b. Neurohumoral transmission, co-transmission and classification of neurotransmitters.</p> <p>c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics.</p> <p>d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).</p> <p>e. Local anesthetic agents.</p> <p>f. Drugs used in myasthenia gravis and glaucoma</p>	10
4	<p>Pharmacology of drugs acting on central nervous system</p> <p>a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.</p> <p>b. General anesthetics and pre-anesthetics.</p> <p>c. Sedatives, hypnotics and centrally acting muscle relaxants.</p> <p>d. Anti-epileptics</p> <p>e. Alcohols and disulfiram</p>	8
5	<p>Pharmacology of drugs acting on central nervous system</p> <p>a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.</p> <p>b. Drugs used in Parkinsons disease and Alzheimer's disease.</p> <p>c. CNS stimulants and nootropics.</p> <p>d. Opioid analgesics and antagonists</p> <p>e. Drug addiction, drug abuse, tolerance and dependence</p>	7

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R. Craig & Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan



GOKUL GLOBAL UNIVERSITY

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

Gokul Pharmacy College

Bachelor of Pharmacy

Subject Code BP405T

Semester: IV

Subject Name: Pharmaceutical Jurisprudence

Scope: This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India.

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

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice.

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:

Unit No.	Topics	Hours
1	<p>Drugs and Cosmetics Act, 1940 and its rules 1945: Objectives, Definitions, Legal definitions of schedules to the Act and Rules Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.</p>	10
2	<p>Drugs and Cosmetics Act, 1940 and its rules 1945. Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Sch F & DMR (OA) Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.</p>	10

Unit No.	Topics	Hours
	Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, licensing authorities, controlling authorities, Drugs Inspectors	
3	<p>Pharmacy Act –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and Penalties</p> <p>Medicinal and Toilet Preparation Act –1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.</p> <p>Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties</p>	10
4	<p>Study of Salient Features of Drugs and Magic Remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties</p> <p>Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties</p> <p>National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)</p>	8
5	<p>Pharmaceutical Legislations: A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee</p> <p>Code of Pharmaceutical ethics: Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath</p> <p>Medical Termination of Pregnancy Act</p> <p>Right to Information Act</p> <p>Introduction to Intellectual Property Rights (IPR)</p>	7

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M.L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)



GOKUL GLOBAL UNIVERSITY

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

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: IV

Subject Code: BP406P	Subject Title: Medicinal 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

4 hrs. per week

I Preparation of drugs/ intermediates

- 1,3-pyrazole
- 1,3-oxazole
- Benzimidazole
- Benzotriazole
- 2,3- diphenyl quinoxaline
- Benzocaine
- Phenytoin
- Phenothiazine
- Barbiturate

II Assay of drugs

- Chlorpromazine
- Phenobarbitone
- Atropine
- Ibuprofen
- Aspirin
- Furosemide

III Determination of Partition coefficient for any two drugs

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
937. Organic Chemistry by I.L. Finar, Vol. II.

8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.



GOKUL GLOBAL UNIVERSITY

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Gokul Pharmacy College

Bachelor of Pharmacy

Semester: IV

Subject Code: BP407P	Subject Title: Physical Pharmaceutics-II (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

Physical Pharmaceutics-II (Practical)

4 hrs. per week

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using Microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

Recommended Books: (Latest Editions)

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.

6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1,2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.



GOKUL GLOBAL UNIVERSITY

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

Gokul Pharmacy College

Bachelor of Pharmacy

Semester: IV

Subject Code: BP408P	Subject Title: Pharmacology-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

Pharmacology-I (Practical)

4 hours per week

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anaesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anaesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata McGraw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs,

The Point LippincottWilliams & Wilkins

5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers MedicalPublishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan



Gokul Pharmacy College

B. Pharm

Bachelor of Pharmacy (B. Pharm)

Batch 2022-23

Course Outcomes (CO)



Students of all undergraduate pharmacy degree programs at the time of graduation will be able to learn:

Semester-I

Subject: Human Anatomy and Physiology I – Theory

Subject Code: BP101T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Explain the gross morphology, structure and functions of various organs of the human body
CO2	To learn and acquire the knowledge of homeostatic mechanisms and their imbalances
CO3	To study and identify the various tissues and organs of different systems along with their co-relation with human body.
CO4	To gain, explore and update the knowledge of special senses and nervous system

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2	1	1	2	1	3	1	3	3	2	0	0
CO2	3	1	2	1	2	2	2	1	2	2	2	3	2	0	0
CO3	3	2	1	1	2	1	1	1	1	2	3	3	2	0	0
CO4	3	1	1	1	1	2	1	1	2	1	3	2	2	0	0



Subject: Pharmaceutical Analysis –Theory

Subject Code: BP102T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Understand the principles of volumetric titration, Calculation of Volumetric analysis, Chemical reaction and pH change during the titration.
CO2	Understand the principles of electro chemical analysis
CO3	Develop analytical skills
CO4	Understanding of the basic concepts of drug analysis

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	1	1	2	1	1	1	2	3	2	0	0
CO2	3	1	2	3	1	1	1	1	1	1	2	3	2	0	0
CO3	3	2	2	1	1	1	1	1	1	1	2	3	2	0	0
CO4	3	1	2	2	1	1	2	1	2	1	2	2	3	0	0



Subject: Pharmaceutics I – Theory

Subject Code: BP103T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Students shall be able to understand the basic concept, history of Pharmacy in India. Also will be able to understand the Pharmacopoeia, various dosage forms, information about prescription and posology means calculation of doses.
CO2	In this course, students will be able to understand the concept of various systems of calculation of dose, solvents/solution, isotonic solution, freezing point etc. Also students should be well aware about the powder and liquids dosage form
CO3	Students shall understand about various Monophasic and Biphasic liquids. Students will know about the methods of preparation of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments, Lotions, Suspensions and Emulsion.
CO4	Students shall be able to understand about the suppositories, displacement value & its calculations. Also students will be able to understand types of Pharmaceutical incompatibilities.
CO5	After completion of this chapter, students will understand about various ointment bases, excipients and methods of preparation and evaluation tests of semisolids

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	2	2	2	2	2	2	3	3	2	0	0
CO2	3	2	2	2	3	2	2	3	2	2	2	3	2	0	0
CO3	3	2	2	3	3	3	3	3	2	2	3	3	2	0	0
CO4	3	3	2	3	2	3	3	2	3	2	2	2	2	0	0
CO5	3	3	3	3	3	2	3	3	2	3	3	2	3	0	0



Subject: Pharmaceutical Inorganic Chemistry (PIC) Theory

Subject Code: BP104T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Explain the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
CO2	Understand method of preparation, physical and chemical properties, medicinal and pharmaceutical importance of inorganic compounds.
CO3	Acquire the knowledge of acids, bases and buffers
CO4	Describe the medicinal and pharmaceutical importance of Radiopharmaceuticals.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1	1	2	2	1	3	3	3	3	2	0	0
CO2	3	1	1	1	1	3	2	3	3	2	3	3	2	0	0
CO3	3	1	2	1	1	2	2	1	3	3	3	3	2	0	0
CO4	3	1	1	1	1	3	2	2	3	3	3	2	2	0	0



Subject name: COMMUNICATION SKILLS

Subject code: BP105T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Understand the basics of communication and its significance in the career as a pharmacist
CO2	Comprehend and express any idea or thought in an effective manner using the four basic communication
CO3	skills: Listening, Speaking, Reading, Writing (LSRW).
CO4	Make effective presentation, face job interview and participate in group communication fruitfully
CO5	Handle various professional communication situations more impressively and effectively
CO6	Enhance the confidence level of students and enable them to communicate in real life.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	0	0	0	0	0	1	1	0	3	2	0	0	0	0	3	2
CO2	0	0	0	0	0	2	1	0	3	2	0	2	0	0	3	2
CO3	0	0	0	0	0	1	1	0	3	1	0	3	0	0	3	3
CO4	0	0	0	0	0	2	2	0	3	2	0	2	0	0	3	2
CO5	0	0	0	0	0	2	1	0	2	1	0	3	0	0	2	3
CO6	0	0	0	0	0	3	2	0	2	1	0	0	0	0	2	1



Subject name: Remedial Mathematics

Subject code: BP106RMT

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Relate the theory and applications of basic mathematics with pharmacy
CO 2	Discuss applications of partial fraction, limits and continuity and logarithm for pharmaceutical computation
CO 3	Understand calculus and analytical geometry for pharmaceutical problems solving
CO 4	Utilize the formulas of matrices and determinant for calculations related to pharmacy
CO 5	Create and evaluate differential equations used in pharmaceutical sciences

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	0	2	0	0	0	0	0	0	0	0	0	3	2	0	0
CO2	3	0	2	0	0	0	0	0	0	0	0	2	3	2	0	0
CO3	3	0	2	0	0	0	0	0	0	0	0	3	3	2	0	0
CO4	3	0	2	0	0	0	0	0	0	0	0	2	3	2	0	0
CO5	3	0	1	0	0	0	0	0	0	0	0	3	3	1	0	0



Subject: REMEDIAL BIOLOGY

Subject-Code: BP 106RBT

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Explain the classification and salient features of five kingdoms of life
CO 2	Demonstrate understanding of the basic components of anatomy & physiology of plant
CO 3	Demonstrate understanding of the basic components of anatomy & physiology animal with special reference to human

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	0	0	3	2	0	0	0	0	0	0	0	0	0
CO2	3	2	0	0	3	2	0	0	0	0	0	0	0	0	0
CO3	3	2	0	0	3	2	0	0	0	0	0	0	0	0	0



Subject: Human Anatomy and Physiology I – Practical

Subject Code: BP107P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Identify various types of epithelial, muscular, connective and nervous tissue.
CO2	Identify and understand concept of axial, appendicular skeleton and separate bone
CO3	Expertise in collection of blood in subject to determination of values like bleeding and clotting time along with their significance in pathological conditions
CO4	Estimation of hemoglobin content, determination of blood group, erythrocyte sedimentation rate (ESR) and their relevance in diseases
CO5	Enumeration of hematological values like white blood cell (WBC) count and total red blood corpuscles (RBC) count through various methods.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	1	3	3	1	3	1	3	3	2	0	0
CO2	3	2	1	1	2	3	3	3	3	1	3	3	2	0	0
CO3	3	1	1	1	1	3	3	1	3	1	3	3	2	0	0
CO4	3	2	1	1	1	3	3	1	3	1	3	2	2	0	0
CO5	3	2	1	1	1	3	3	1	3	1	3	2	3	0	0



Subject: Pharmaceutical Analysis – Practical

Subject Code: BP108P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student shall able to state principles of volumetric and electrochemical analysis
CO2	Student shall able to prepare various concentrations of solutions (Molar/Normal)
CO3	Student shall able to carry out various volumetric and electrochemical titrations
CO4	Student shall able to have analytical skills as mentioned in syllabus

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1	1	2	2	1	3	3	3	3	2	0	0
CO2	3	1	1	1	1	3	2	3	3	2	3	3	2	0	0
CO3	3	1	2	1	1	2	2	1	3	3	3	3	2	0	0
CO4	3	1	1	1	1	3	2	2	3	3	3	2	3	0	0



Subject: Pharmaceutics I Practical

Subject Code: BP109P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Students should know about the formulation aspects of various dosage forms like syrups, elixirs and linctus.
CO2	Should be able to understand the procedure and various excipients used in liquid dosage forms.
CO3	Students should be able to calculate the quantities of ingredients and packaging of powder like ORS powder (WHO), Effervescent granules, Dusting powder and Divided powders.
CO4	Students will be able to understand various semisolid bases and the methods of manufacturing of ointments and suppositories. Also, should know about the gargles in throat infection.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	2	1	1	1	1	3	1	3	3	2	0	0
CO2	3	2	3	2	1	1	2	1	2	1	2	3	2	0	0
CO3	3	1	1	1	2	1	1	1	1	1	1	3	2	0	0
CO4	3	1	1	1	1	2	1	2	1	2	3	2	2	0	0



Subject: Pharmaceutical Inorganic Chemistry (PIC) Practical

Subject Code: BP110P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Perform the procedure/method for identifying impurities in pharmaceuticals.
CO2	Explain the procedure for identification of inorganic compounds and their impurities.
CO3	Understand the method of preparation of inorganic pharmaceuticals

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO2	PSO3	PSO4
CO1	3	2	3	1	1	3	1	1	3	3	3	2	0	0
CO2	3	2	3	1	1	3	1	1	3	3	3	2	0	0
CO3	3	2	3	1	1	2	1	1	2	3	3	2	0	0



Subject: Communication skills (Practical)

Subject Code: BP111P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Develop basic communication skills by meeting people and asking questions
CO 2	Demonstrate understanding of Pronunciation (Consonant Sounds), Pronunciation and Nouns and Pronunciation (Vowel Sounds)
CO 3	Demonstrate understanding of effective communication and effective writing, email etiquette, presentation skills and interview handling skills

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	0	0	1	0	3	2	0	0	3	0	0	0	0	0	0
CO2	0	0	1	0	3	2	0	0	3	0	0	0	0	0	0
CO3	0	0	3	0	3	2	0	0	3	0	0	0	0	0	0



Subject Title: REMEDIAL BIOLOGY -PRACTICAL

Subject Code: BP112RBP

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Demonstrate understanding of the basic components of anatomy & physiology of plant
CO 2	Demonstrate understanding of the basic components of anatomy & physiology of animal with special reference to human
CO 3	Determine blood group and explain the significance of determination of blood group

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	0	3	0	0	0	0	0	0	0	0	0	0
CO2	3	3	1	0	3	0	0	0	0	0	0	0	0	0	0
CO3	3	3	1	0	3	0	1	0	0	0	0	0	0	0	0



Semester-II

Subject: Human Anatomy and Physiology II– Theory

Subject Code: BP 201T

COURSE OUTCOME	DESCRIPTION/STATEMENT
CO1	To understand the gross morphology, structure and functions of various organs of the human body.
CO2	To learn the basis of various homeostatic mechanisms and their imbalances
CO3	To identify the various tissues and organs of different systems of human body.
CO4	To acquire knowledge about hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record bloodpressure, heart rate, pulse and respiratory volume along with its rationale
CO5	To understand and analyze the co-ordinated working pattern of different organs system.
CO6	To gained the knowledge about interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	2	1	1	1	1	3	1	3	3	2	0	0
CO2	3	2	3	2	1	1	2	1	2	1	2	3	2	0	0
CO3	3	1	1	1	2	1	1	1	1	1	1	3	2	0	0
CO4	3	1	1	1	1	2	1	2	1	2	3	2	2	0	0
CO5	3	2	3	2	1	1	2	1	2	1	2	2	3	0	0
CO6	3	1	3	2	1	1	1	1	3	1	3	2	3	0	0

**Subject:** Pharmaceutical Organic Chemistry-I (POC-I) Theory**Subject Code:** BP202T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Describe the classification of organic compounds and write the structure, name and the type of isomerism of the organic compounds
CO 2	Explain hybridization in alkanes, alkenes and alkynes, and stabilities in alkene and conjugated dienes
CO 3	Acquire knowledge about preparation, reactivity, properties and uses of compounds with functional groups, such as alkyl halides, alcohols, aldehydes, ketones, carboxylic acids, and amines
CO 4	Explain the mechanism involved in the substitution, addition, nucleophilic and elimination reactions

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2	1	3	1	2	2	1	3	3	2	0	0
CO2	3	1	2	2	1	3	1	2	2	1	3	3	2	0	0
CO3	3	2	2	2	1	3	1	2	2	1	3	3	2	0	0
CO4	3	1	3	2	1	3	1	2	1	1	3	2	2	0	0



Subject name: Pharmaceutical Engineering– Theory

Subject Code: BP203T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	My students should be able to explain various Unit Operation mentioned as per in syllabus
CO2	My students should be able to demonstrate and operate various machines used in mentioned in syllabus
CO3	My students should be able to explain the material handling techniques as mentioned in syllabus which will also help them in research and development.
CO4	My students should be able to practice various steps to prevent environmental pollution
CO5	My students should be able to recall and describe various process involved in manufacturing of pharmaceuticals.
CO6	My students should be able to summarize about significance of plant-layout, corrosion and industrial hazards.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2	2	2	2	2	2	2	2	3	2	0	0
CO2	3	1	2	2	2	2	2	2	2	2	2	3	2	0	0
CO3	3	1	2	2	2	2	2	2	2	2	2	3	2	0	0
CO4	3	1	2	2	2	2	2	2	2	2	2	2	2	0	0
CO5	3	1	2	2	2	2	2	2	2	2	2	2	3	0	0
CO6	3	1	2	2	2	2	2	2	2	2	2	2	3	0	0

**Subject name:** Computer Applications in Pharmacy.**Subject Code:** BP204T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Know the number systems, conversion, calculations and the concept of the information systems and software in pharmacy
CO2	Understand various types of applications of software used in pharmacy
CO3	Understand the various web technologies and the different databases and various applications of databases in pharmacy.
CO4	Apply the knowledge of Bioinformatics Databases, and data analysis in Preclinical development like CDS, LIMS and TIMS
CO5	Design questionnaires, invoice tables, drug information storage and its retrieval and its side effects.
CO6	using word process Create a personal HTML webpage, invoice tables, generate reports and Exporting Tables, Queries, Forms and Reports

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	1	0	0	0	0	0	0	0	0	2	1	0	0
CO2	2	1	1	1	0	0	0	0	0	0	0	0	2	1	0	0
CO3	2	2	1	1	0	0	0	0	0	0	0	0	2	2	0	0
CO4	2	2	2	2	0	0	0	0	0	0	0	0	2	2	0	0
CO5	2	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0
CO6	2	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0



Subject Code: Environmental Sciences– Theory

Subject Code: BP205T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student should able to explain basics of environment like ecology, ecosystem, food chain, food web and ecological pyramids
CO2	Student should able to describe list natural resources and explain their conservation
CO3	Student should able to describe the current problems of environment and how to solve them, role of individual in conservation of environment.
CO4	student should able to understand and identify the different types of environmental pollution and measures to minimize it
CO5	Student should able to understand and explain the concept of ecosystem, structure, function of forest ecosystem, grass ecosystem, desert ecosystem& aquatic ecosystem.
CO6	Student should able to understand the components of Ecosystem and Energy flow within it.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	0	2	2	0	0	0	0	2	2	0	0	0	0	1
CO2	2	3	1	3	0	0	0	0	1	2	0	0	0	0	2
CO3	2	0	3	2	0	1	0	0	3	2	0	0	0	0	2
CO4	2	0	2	3	0	0	0	0	2	2	0	0	0	0	2
CO5	3	2	2	2	0	0	0	0	1	0	0	0	0	0	2
CO6	2	0	3	3	0	0	0	0	1	3	0	0	0	0	2

**Subject:** Human Anatomy and Physiology II– Practical**Subject code:** BP 206P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Able to learn the anatomy and physiology of organs of digestive system like salivary glands, stomach, intestine, pancreas and liver and process of Carbohydrate, Protein and Fat digestion and absorption.
CO2	Understand the Organization and functions of brain, Spinal cord, afferent and efferent nerves.
CO3	Perform the anatomy and physiology of urinary system, structure of Nephron, formation of urine, mechanism of micturition and regulation of body fluid volume
CO4	Identify the Physiology of hormones of hypothalamus-pituitary gland, adrenal gland, thyroid gland, pancreas and gonads (testis and ovary).
CO5	Able to learn the anatomy and functions of organs of respiratory system, exchange of respiratory gases, transport of respiratory gases, regulation of respiration, respiratory volumes and vital capacity.
CO6	Explain the Anatomy and physiology of reproductive organs, pregnancy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	1	2	0	1	2	0	3	3	2	0	0
CO2	3	2	2	2	1	1	0	1	2	0	3	3	2	0	0
CO3	3	2	3	2	1	1	0	1	3	0	3	3	2	0	0
CO4	3	3	2	2	1	1	0	1	1	0	3	2	2	0	0
CO5	3	2	2	2	1	1	0	1	3	0	3	2	3	0	0
CO6	3	2	2	2	1	1	0	1	1	0	3	2	3	0	0

**Subject:** Pharmaceutical Organic Chemistry-I (POC-I) Practical**Subject Code:** BP207P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Acquire knowledge of, and training in systematic qualitative analysis of unknown organic compounds.
CO 2	Acquire knowledge of, and training in Identification of the unknown compound from the literature using melting point/ boiling point.
CO 3	Learn and understand the method of preparation of suitable solid derivatives from organic compounds

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1	1	2	1	2	2	2	3	3	2	0	0
CO2	3	2	3	1	1	2	1	2	2	2	3	3	2	0	0
CO3	3	1	1	1	1	2	1	2	2	2	3	3	2	0	0



Subject: Pharmaceutical Engineering– Practical

Subject Code: BP208P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	My students should be able to describe various unit operations used in pharmaceutical industries mentioned in syllabus
CO 2	My students should be able to explain and practice various process involved in process.
CO 3	My students should be able understand the application of various machines used in labs and industries mentioned in syllabus.
CO 4	My students should be able to identify and summarize the material handling techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	2	2	1	1	1	3	3	2	0	0
CO2	3	3	2	2	2	2	2	1	1	1	3	3	2	0	0
CO3	3	3	2	2	2	2	2	1	1	1	3	3	2	0	0
CO4	3	3	2	2	2	2	2	1	1	2	3	2	2	0	0

**Semester -III****Subject:** Pharmaceutical Organic Chemistry II– Theory**Subject Code:** BP301T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Draw the structures and name the various organic compounds like benzene, phenols, aromatic amines aromatic acids etc.
CO2	Explain the concepts of aromaticity of aromatic hydrocarbons.
CO3	Understand and write the aromatic electrophilic reaction name and explain effect of substitution on orientation of aromatic electrophilic reactions.
CO4	Explain the use of analytical constants in analysis of fats and oils
CO5	Relate the reactivity and stability of cyclo alkanes.
CO6	Understand and write the reaction, mechanism and outline the synthesis of benzene and its derivatives, phenols, aromatic amines and acids, polynuclear hydrocarbons and cycloalkanes like cyclopropane and cyclo butane

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	3	3	2	3	2	3	3	2	0	0
CO2	3	2	3	3	2	3	2	2	3	2	3	3	2	0	0
CO3	3	2	2	3	2	3	2	2	3	2	3	3	2	0	0
CO4	3	2	2	3	2	3	2	2	3	2	3	2	2	0	0
CO5	3	2	2	3	2	3	2	2	3	2	3	2	3	0	0
CO6	3	2	2	3	2	3	2	2	3	2	3	2	3	0	0



Subject: Physical Pharmaceutics – I Theory

Subject Code: BP302T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Students shall be able to understand and describe the concept of solubility, mechanism behind solute-solvent interactions and predict the factors influencing solubility of the drugs.
CO2	Students shall be able to identify different states of matter at different condition and understand certain physicochemical properties of the drug substances.
CO3	Students shall be able to differentiate between surface and interface and identify surface and interfacial tension, classify and list different surface active agents and recall HLB scale.
CO4	Students shall be able to classify and evaluate complexation, its application, and interpret methods of analysis.
CO5	After completion of this topic, students will understand about Sorensens pH scale, pH determination applications of buffers in pharmaceutical and biological systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	2	2	1	2	3	2	2	3	2	0	0
CO2	2	1	2	3	2	3	2	3	2	2	3	3	2	0	0
CO3	2	2	3	3	3	3	2	3	3	1	2	3	2	0	0
CO4	2	2	3	1	2	3	2	1	2	3	3	2	2	0	0
CO5	3	2	3	2	2	2	3	2	3	2	2	2	3	0	0



Subject: Biochemistry- Theory

Subject Code: BP303T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student will be able to Classify & explain the chemical nature & biological role of bio-molecules & also Identify the concepts of bioenergetics included in the syllabus
CO2	Student will be able to Describe the metabolic pathways for nutrient molecules in physiological and pathological condition given in the syllabus
CO3	Student will be able to Explain the Biological Oxidation process & describe the metabolic pathways for lipid metabolism, their biological significance & disorders included in the syllabus
CO4	Student will be able to Describe the amino acid metabolism & outline the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins
CO5	Student will be able to State the Biosynthesis of purine, pyrimidine nucleotides & Catabolism of purine nucleotides
CO6	Student will be able to Explain the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	3	1	2	2	1	1	2	3	2	0	0
CO2	3	2	3	2	2	3	2	2	2	2	2	3	2	0	0
CO3	3	2	3	2	2	2	1	3	2	2	2	3	2	0	0
CO4	3	3	3	2	3	2	2	2	2	2	2	2	2	0	0
CO5	3	2	3	2	2	2	1	2	2	2	2	2	3	0	0
CO6	3	2	3	3	3	2	1	2	2	2	2	2	3	0	0



Subject: Pathophysiology – Theory

Subject Code: BP 304T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Describe the etiology and pathogenesis of the selected disease states
CO 2	Understand the signs and symptoms of the diseases
CO 3	To learn and acquire the knowledge about basic mechanism of cell injury, adaptation and inflammation process
CO 4	To understand the complications of diseases /disorders

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	2	1	1	1	1	3	1	3	2	0	0	0
CO2	3	2	3	2	1	1	2	1	2	1	2	2	0	0	0
CO3	3	1	1	1	2	1	1	1	1	1	1	1	0	0	0
CO4	3	1	1	1	1	2	1	2	1	2	3	2	0	0	0



Subject: Pharmacognosy and Phytochemistry -I – Theory

Subject Code: BP305T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	To aware and explain the students about Scope of Pharmacognosy, Classification of Drugs and parameters required to determine the quality control of Drugs
CO 2	To Identify and perform the techniques in the cultivation and production of crude drugs
CO 3	To study and identify the crude drugs, their uses and chemical nature
CO 4	To explain the various the plant tissue culture and its application
CO 5	To explain about the various system of medicines and secondary metabolite
CO 6	To explain and understand about the biological source, chemical nature and uses of drugs of natural origin containing following drugs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	2	0	0	0	0	0	0	0	3	0	0	0
CO2	1	2	2	3	0	0	0	0	0	0	0	3	0	0	0
CO3	1	2	3	2	0	0	0	0	0	0	0	3	0	0	0
CO4	1	2	3	3	0	0	0	0	0	0	0	2	0	0	0
CO5	3	1	2	2	0	0	0	0	0	0	0	2	0	0	0
CO6	2	1	3	3	0	0	0	0	0	0	0	2	0	0	0



Subject: Pharmaceutical Organic Chemistry II– Practical

Subject Code: BP306P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Describe about the different mechanistic steps involved in synthesis of organic compounds like benzanilide, benzoic acid etc.
CO 2	Explain different purification methods like re-crystallization and steam distillation
CO 3	Understand to determine acid value, saponification value and iodine value.
CO 4	Explain the different reaction and mechanism involved in synthesis of organic compounds like acylation, bromination, nitration, oxidation, diazotization, hydrolysis, Claisen-Schimidt reaction and Perkin reaction.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	2	3	3	2	3	2	3	3	2	0	0
CO2	3	3	3	2	2	3	3	2	3	2	3	3	2	0	0
CO3	3	3	3	2	2	3	2	2	3	2	3	3	2	0	0
CO4	3	3	3	2	2	2	2	2	3	2	3	2	2	0	0



Subject: Physical Pharmaceutics – I Practical

Subject Code: BP307P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Students shall be able to understand the concept of solubility, pKa value by Half Neutralization/Henderson Hasselbalch equation and partition co-efficient of substances.
CO2	Students shall be able to understand critical solution temperature and candetermined unknown concentration in CST. Also able to understand and evaluate surface tension by drop count and drop weight method.
CO3	Students will understand about HLB, its scale and number of a surfactant andits applications. Also students will be well stood by Freundlich and Langmuir constants theory using activated charcoal
CO4	Students shall understand about the concept of surfactants, its applications and critical micellar concentration of surfactants.
CO5	Students shall understand stability constant and donor acceptor ratio of drugcomplex by Solubility and pH titration method.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	2	2	2	1	2	3	2	2	3	2	0	0
CO2	2	1	2	3	2	3	2	3	2	2	3	3	2	0	0
CO3	2	2	3	3	3	3	2	3	3	1	2	3	2	0	0
CO4	2	2	3	1	2	3	2	1	2	3	3	2	2	0	0
CO5	3	2	3	2	2	2	3	2	3	2	2	2	3	0	0



Subject: Biochemistry Practical

Subject Code: BP308P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student will be able to Recognize the class of biomolecules & reducing sugars given in the syllabus by qualitative analysis of the unknown sample
CO2	Student will be able to Identify the types of Protein present in the unknown sample
CO3	Student will be able to Predict the amount of essential components present in the given sample of blood mentioned in the syllabus
CO4	Student will be able to Describe the methods of preparation of buffers of different pH & their measurement
CO5	Student will be able to Study the Enzymatic Hydrolysis of starch
CO6	Student will be able to Estimate the effect of Temperature, substrate concentration on salivary amylase activity

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3	1	3	2	2	3	3	3	2	0	0
CO2	3	2	3	2	3	2	3	2	2	3	2	3	2	0	0
CO3	3	3	2	2	3	1	3	2	2	3	3	3	2	0	0
CO4	3	2	3	2	3	2	3	2	2	3	2	2	2	0	0
CO5	3	3	2	2	3	1	3	2	2	3	3	2	3	0	0
CO6	3	2	3	2	3	2	3	2	2	3	2	2	3	0	0



Subject: Pharmacognosy and Phytochemistry -I - Practical

Subject Code: BP309P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	To identify and explain the equipment used in the pharmacognosy laboratory.
CO2	To perform and understand the morphological and microscopical evaluation of crude drug.
CO3	To carry out the analysis of the crude drug by chemical test.
CO4	To identify the purity and quality crude drug by quality control test.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	4	0	0	0	0	0	0	0	3	0	0	0
CO2	2	1	3	1	0	0	0	0	0	0	0	3	0	0	0
CO3	1	1	3	2	0	0	0	0	0	0	0	3	0	0	0
CO4	1	1	3	2	0	0	0	0	0	0	0	2	0	0	0



Semester-IV

Subject: Pharmaceutical Organic Chemistry III– Theory

Subject Code: BP401T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Explain the concepts of stereo chemistry, their structural representation.
CO 2	Draw and compare the three-dimensional structure of Lactic acid and tartaric acid
CO 3	Describe and classify stereo isomerism in optical isomers with R/S nomenclature, geometrical isomers with cis-trans and E/Z nomenclature, atropisomers and conformational isomers and discuss the stability of conformation of ethane, n-butane and cyclohexane
CO 4	Describe and classify, draw and name the structures of heterocyclic compounds under study
CO 5	Understand and draw the reactions of and outline the synthesis of heterocyclic compounds under study.
CO 6	Understand and draw the reactions and mechanism of various reactions of synthetic importance under study.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	1	2	1	2	3	2	3	3	0	0	0
CO2	3	2	2	2	1	2	1	2	3	2	3	3	0	0	0
CO3	3	2	2	2	1	2	1	2	3	2	3	3	0	0	0
CO4	3	2	2	2	1	2	1	2	3	2	3	2	0	0	0
CO5	3	2	2	2	1	2	1	2	3	2	3	2	0	0	0
CO6	3	2	2	2	1	2	1	2	3	2	3	2	0	0	0

**Subject:** Medicinal Chemistry-I: – Theory**Subject Code:** BP402T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student shall able to memorize the different Physicochemical properties which affects biological action of drugs
CO2	Student will able to Understand drug metabolism and able to explain the factors affecting drug metabolism
CO3	Student will able to explain development , Classification, mechanism ofaction, uses of drugs acting on Autonomic Nervous system Also able to outline the Structure activity relationship, synthesis and biosynthesis of important drugs and neurotransmitters involve in ANS
CO4	Student will able to describe the Development, Classification mechanism of action, SAR, uses and synthesis of Sedatives and Hypnotics, Anti psychoticsgiven in syllabus
CO5	Student will able to recognize the Development, Classification mechanism of action, SAR, uses and synthesis of, Anti-consultants and Generalanesthetics given in syllabus
CO6	student will able to Explain the Development, Classification mechanism ofaction, SAR, uses and synthesis of Narcotic, non-narcotic analgesics including Non-steroidal anti-inflammatory drugs mention in syllabus

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	3	1	2	2	2	2	1	3	3	2	0	0
CO2	3	1	3	1	1	3	3	1	3	1	3	3	2	0	0
CO3	3	1	3	3	1	3	3	1	3	1	3	3	2	0	0
CO4	3	1	3	3	1	3	3	1	3	1	3	2	3	0	0
CO5	3	1	3	3	1	3	3	1	3	1	3	2	3	0	0
CO6	3	1	3	3	1	3	3	1	3	1	3	2	3	0	0



Subject: Physical Pharmaceutics II – Theory

Subject Code: BP403T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	My student should be able to explain complete information about the Colloidal Dispersion as per the syllabus
CO 2	My student should be able to explain Newtonian system, Non Newtonian system and Deformation of Solids at the completion of the syllabus
CO 3	My student should be able to summarize Coarse Dispersion and can demonstrate the preparation techniques and problem in the preparation of emulsion
CO 4	My student should be able to recall micromeritics and can employ powder characteristics and its evaluation techniques in designing of dosage form like tablets.
CO 5	My student should be able to describe Drug Stability and its factor, Accelerated stability study and relate them in development of the formulation like tablets, colloidal solutions etc.
CO 6	My student should be able to apply their knowledge of physical and chemical properties of drug molecule in development of the formulation like tablets, colloidal solutions etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	2	2	2	2	2	2	3	3	0	0	0
CO2	3	1	2	1	2	2	2	2	2	2	3	3	0	0	0
CO3	3	1	2	1	2	2	2	2	2	2	3	3	0	0	0
CO4	3	1	2	1	2	2	2	2	2	2	3	2	0	0	0
CO5	3	1	2	1	2	2	2	2	2	2	3	2	0	0	0
CO6	3	1	2	1	2	2	2	2	2	2	3	2	0	0	0



Subject: Pharmacology-I Theory

Subject Code: BP 404T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	To understand the basic concept in pharmacology & pharmacological actions of different categories of drugs
CO2	To learn and acquire the knowledge about mechanism of drug action at receptor /organ system/sub cellular/ macromolecular levels.
CO3	To improve the applicability of the basic pharmacological knowledge in the prevention and treatment of various diseases
CO4	To learn and understand the co-relation of pharmacology with other biomedical sciences

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3	1	1	1	2	3	2	3	3	0	0	0
CO2	3	2	3	2	1	2	1	2	2	2	3	3	0	0	0
CO3	2	3	2	1	1	2	2	2	2	1	3	3	0	0	0
CO4	3	1	3	3	1	1	2	2	3	3	3	2	0	0	0



SUBJECT NAME: Pharmaceutical Jurisprudence

SUBJECT CODE: BP405T

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Know the various laws governing the manufacturing, sale, research & usage of drugs.
CO2	Understand rationale and importance of various acts, rules and regulations governing pharmacy profession.
CO3	Apply principles of ethical practices and code of conduct as a pharmacist.
CO4	Analyze the critical requirement and procedure for licensing of Pharmaceutical products.
CO5	Evaluate and update latest amendments in various acts, rules and regulations of Pharmaceutical

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	0	0	0	0	0	0	3	0	1	0	0	2	0	0	0
CO2	2	0	0	0	0	0	0	3	0	2	0	0	2	0	0	0
CO3	2	0	0	0	0	0	0	3	0	2	0	0	2	0	0	0
CO4	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0



Subject: Medicinal Chemistry-I Practical

Subject Code: BP406P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	Student will able to outline the procedure, principle, mechanism and documentation of synthesis of drugs and their intermediate given in syllabus
CO2	Student will able to describe the method for isolation, purification and characterization of drugs and intermediate given in syllabus
CO3	Student will able to perform the assay of drugs and their preparation by pharmacopeial method for drugs given in syllabus
CO4	Student will capable to determine the partition coefficient of drugs given in syllabus

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	2	1	2	3	2	2	3	3	2	0	0
CO2	3	3	2	3	2	1	2	3	2	2	3	3	2	0	0
CO3	3	3	2	1	2	1	2	3	2	2	3	3	2	0	0
CO4	3	3	1	1	2	1	2	3	1	1	3	2	3	0	0



Subject: Physical Pharmaceutics II – Practical

Subject Code: BP407P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO 1	Students should be able to understand various physio chemical properties of powder, liquids in designing the dosage forms.
CO 2	Students should be able to explain physio chemical properties in the formulation development and evaluation of dosage forms
CO 3	Students should be able to identify and describe various instruments handling techniques .
CO 4	Students should be able to explain principle of chemical kinetics and to use them for stability testing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1	2	2	2	2	2	2	3	3	0	0	0
CO2	3	2	2	1	2	2	2	2	2	2	3	3	0	0	0
CO3	3	2	2	1	2	2	2	2	2	2	3	3	0	0	0
CO4	3	2	2	1	2	2	2	2	2	2	3	2	0	0	0



Subject: Pharmacology-I Practical

Subject Code: BP 408P

COURSE OUTCOMES	DESCRIPTION/STATEMENT
CO1	To know the knowledge about instruments and animals used in experimental pharmacology
CO2	To explain the knowledge about CPSCEA guidelines for maintenance of laboratory animals
CO3	To perform skills about blood withdrawal , collection , separation of plasma and serum along with anesthesia and euthanasia
CO4	To understand the effect of drugs on animals by simulated experiments

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	1	0	1	0	3	3	0	3	3	3	3	0	0	0
CO2	3	0	2	1	1	2	2	0	2	0	3	3	0	0	0
CO3	3	1.5	3	0	1.5	3	2.5	2.5	2.5	0	2	3	0	0	0
CO4	1	0	3	1.5	0	3	2	0	2	2.5	2.5	2	0	0	0