



SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)
Syllabus with effect from the Academic Year 2022-2023

PROGRAMME STRUCTURE
Bachelor of Pharmacy (B. Pharm) Semester: IV

To Pass	At least 40% Marks in the aggregate of University and Internal examination in each course.							
Course Type	Course code	Name of the course	Credit	Contact Hours per Week	Exam Duration in Hrs	Component of Marks		
						Internal	End Semester	Total
Core Course	UP04CBPH01	Pharmaceutical Organic Chemistry III– Theory	4	4	3	25/10	75/30	100/40
	UP04CBPH02	Medicinal Chemistry I – Theory	4	4	3	25/10	75/30	100/40
	UP04CBPH03	Physical Pharmaceutics II –Theory	4	4	3	25/10	75/30	100/40
	UP04CBPH04	Pharmacology I – Theory	4	4	3	25/10	75/30	100/40
	UP04CBPH05	Pharmacognosy and Phytochemistry I– Theory	4	4	3	25/10	75/30	100/40
	UP04CBPH06	Medicinal Chemistry I – Practical	2	4	4	15/6	35/14	50/20
	UP04CBPH07	Physical Pharmaceutics II – Practical	2	4	4	15/6	35/14	50/20
	UP04CBPH08	Pharmacology I – Practical	2	4	4	15/6	35/14	50/20
	UP04CBPH09	Pharmacognosy and Phytochemistry I – Practical	2	4	4	15/6	35/14	50/20
	Total:			28	-	-	185	515





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH01	Title of the Course	Pharmaceutical Organic Chemistry - III -Theory
Total Credits of the Course	4	Hours per Week	3 + 1 (Tutorial)

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:	Upon completion 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 4. Understand and name various Organic compounds

Course Content		
• Note: To emphasize on definition, types, mechanisms, examples, uses/applications		
Unit	Description	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. Conformational isomerism in Ethane, n-Butane and Cyclohexane. Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity. Stereospecific and stereoselective reactions	10
3	Heterocyclic compounds: Nomenclature and classification	10





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	Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene Relative aromaticity and reactivity of Pyrrole, Furan and Thiophene	
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	08
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	07

Suggested References:

Sr. No	References
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. Gilchrist





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH02	Title of the Course	Medicinal Chemistry I – Theory
Total Credits of the Course	4	Hours per Week	3 + 1 (Tutorial)

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

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	Description	Hours
1	<ul style="list-style-type: none">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. Adrenergic receptors (Alpha & Beta) and their distribution. Sympathomimetic agents: SAR of Sympathomimetic agents Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine, Methyldopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline. Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine,	10





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	<p>Propylhexedrine, Agents with mixed mechanism: Ephedrine, Metaraminol.</p> <p>Adrenergic Antagonists: Alpha adrenergic blockers: Tolazoline*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.</p> <p>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.</p> <p>Parasympathomimetic agents: SAR of Parasympathomimetic agents</p> <p>Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine, Pilocarpine.</p> <p>Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible): Physostigmine, Neostigmine*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isofluorophate, Echothiophate iodide, Parathion, Malathion.</p> <p>Cholinesterase reactivator: Pralidoxime chloride.</p> <p>Cholinergic Blocking agents: SAR of cholinolytic agents</p> <p>Solanaceous alkaloids and analogues: Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide*.</p> <p>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>Drugs acting on Central Nervous System</p> <p>A. Sedatives and Hypnotics:</p> <p>Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem</p> <p>Barbiturtes: SAR of barbiturates, Barbitol*, Phenobarbital, Mephobarbital, Amobarbital, Butobarbital, Pentobarbital, Secobarbital</p> <p>Miscellaneous: Amides & imides: Glutethimide. Alcohol & their carbamate derivatives: Meprobomate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.</p> <p>B. Antipsychotics</p> <p>Phenothiazines: SAR of Phenothiazines - Promazine hydrochloride, Chlorpromazine hydrochloride*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.</p>	08





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	<p>Ring Analogues of Phenothiazines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.</p> <p>Fluorobutero-phenones: Haloperidol, Droperidol, Risperidone.</p> <p>Beta amino ketones: Molindone hydrochloride.</p> <p>Benzamides: Sulpieride.</p> <p>C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action</p> <p>Barbiturates: Phenobarbitone, Methobarbital.</p> <p>Hydantoin: Phenytoin*, Mephenytoin, Ethoin Oxazolindione diones: Trimethadione, Paramethadione</p> <p>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*, Thiethyl 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, Anileridine 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>	07

Suggested References:	
Sr. No	References
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.





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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





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH03	Title of the Course	Physical Pharmaceutics - II - Theory
Total Credits of the Course	4	Hours per Week	3 + 1 (Tutorial)

Scope:	The course deals with the various physical and physicochemical properties, and principles 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 <ol style="list-style-type: none">1. Understand various physicochemical properties of drug molecules in the designing the dosage forms2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.4. Understand the mechanism of viscosity in developing semisolid dosage forms and cosmetic preparations

Course Content		
Unit	Description	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.	07
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, Heckel equation, Stress, Strain, Elastic Modulus	08
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





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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.	10
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	10

Suggested References:

Sr. No	References
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	Lieberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6	Lieberman 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	Physical Pharmaceutics by C.V.S. Subramanyam
9	Test book of Physical Pharmacy, by Gaurav Jain & Roop K. Khar





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH04	Title of the Course	Pharmacology-I (Theory)
Total Credits of the Course	4	Hours per Week	3+1 (Tutorial)

Scope:	One of the main study domains under Biomedical Science and the pharmaceutical industry is studying how medicines affect a living organism and how the body responds to the medicine. The domain comprises the sources, chemical features, biological impacts, and therapeutic uses of medicines. These impacts can be therapeutic or lethal, based on various determinants.
Objectives:	Student would 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

Course Content		
Unit	Description	Hours
1	General Pharmacology <ul style="list-style-type: none">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 non-competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.	08
2	<ul style="list-style-type: none">Pharmacokinetics: Membrane transport, absorption, distribution, metabolism and excretion of drugs. Enzyme induction, enzyme inhibition, kinetics of eliminationPharmacodynamics: Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein-coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship,	12





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	<p>therapeutic index, combined effects of drugs and factors modifying drug action.</p> <ul style="list-style-type: none">• Adverse drug reactions and Drug interactions• Drug discovery and clinical evaluation of new drugs: Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	
3	<p>Pharmacology of drugs acting on peripheral nervous system</p> <ul style="list-style-type: none">• Organization and function of ANS• Neurohumoral transmission, co-transmission & classification of neurotransmitters.• Parasympathomimetic, Parasympatholytic, Sympathomimetics, Sympatholytic.• Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).• Local anesthetic agents.• Drugs used in myasthenia gravis and glaucoma	10
4	<p>Pharmacology of drugs acting on central nervous system</p> <ul style="list-style-type: none">• Neurohumoral transmission in the CNS. Special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine.• General anesthetics and pre-anesthetics.• Sedatives, hypnotics and centrally acting muscle relaxants.• Anti-epileptics• Alcohols and disulfiram	08
5	<p>Pharmacology of drugs acting on central nervous system</p> <ul style="list-style-type: none">• Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens.• Drugs used in Parkinson's disease and Alzheimer's disease.• CNS stimulants and nootropics.• Opioid analgesics and antagonists• Drug addiction, drug abuse, tolerance and dependence.	07

Suggested References:

Sr. No	References
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 Mc Graw-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.





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	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 Physical Pharmaceutics by Ramasamy C, and Manavalan R.
6	Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
7	Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert
8	Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
9	Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan
10	K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P)Ltd, New Delhi





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH05	Title of the Course	Pharmacognosy and Phytochemistry-I (Theory)
Total Credits of the Course	4	Hours per Week	3+1 (Tutorial)

Objectives:	Student would be able to: 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. To know the evaluation techniques for the herbal drugs 4. To carry out the microscopic and morphological evaluation of crude drugs
Scope:	The scope of this subject is to deliver the knowledge of plant taxonomy, plant breeding, plant pathology and plant genetics and its role in the development of cultivation technology for medicinal and aromatic plants.

Course Content		
Units	Description	Hours
1	Introduction to Pharmacognosy: <ul style="list-style-type: none">• Definition, history, scope and development of Pharmacognosy• Sources of Drugs – Plants, Animals, Marine & Tissue culture• Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilage, oleoresins and oleo- gum -resins). Classification of drugs: <ul style="list-style-type: none">• Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs Pharmacognosy in various systems of medicine: <ul style="list-style-type: none">• Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.	10
2	Plant tissue culture: <ul style="list-style-type: none">• Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance. Applications of plant tissue culture in pharmacognosy. Edible vaccines	10
3	Cultivation, Collection, Processing and storage of drugs of natural origin: <ul style="list-style-type: none">• Cultivation and Collection of drugs of natural origin Factors influencing cultivation of medicinal plants. Plant hormones and their applications.	07





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	<ul style="list-style-type: none">• Polyploidy, mutation and hybridization with reference to medicinal plants• Conservation of medicinal plants Quality control of Drugs of Natural Origin: <ul style="list-style-type: none">• Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.• Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, Diagrams of microscopic objects to scale with camera lucida.	
4	Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs (Plant Products): <ul style="list-style-type: none">• Fibers - Cotton, Jute, Hemp,• Hallucinogens, Teratogens, Natural allergens Primary metabolites: <ul style="list-style-type: none">• 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:<ul style="list-style-type: none">• 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	10
5	Introduction to secondary metabolites: Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins	08

Suggested References:

Sr. No.	References
1	W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2	Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3	Text Book of Pharmacognosy by T.E. Wallis
4	Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5	Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6	Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New





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	Delhi.
7	Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007
8	Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9	Anatomy of Crude Drugs by M.A. Iyengar





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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH06	Title of the Course	Medicinal Chemistry I – Practical
Total Credits of the Course	2	Hours per Week	4

Objectives:	Upon completion of the course the student shall be able to 1. Preparation/ Synthesis of various medicinal compounds. 2. Determination quantitatively the intermediates 3. Determine partitioning of compounds between two immiscible solvents 4. Develop experimental skill for synthesis of medicinal compounds
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Course Content	
Sr. No.	Description
1	I Preparation of drugs/ intermediates 1,3-pyrazole, 1,3-oxazole, Benzimidazole, Benzotriazole, 2,3- diphenyl quinoxaline, Benzocaine, Phenytoin, Phenothiazine, Barbiturate
2	II Assay of drugs Chlorpromazine, Phenobarbitone, Atropine, Ibuprofen, Aspirin, Furosemide
3	III Determination of Partition coefficient for any two drugs

Suggested References:	
Sr. No	References
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





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Course Code	UP04CBPH07	Title of the Course	Physical Pharmaceutics-II (Practical)
Total Credits of the Course	2	Hours per Week	4

Objectives:	Student would be able to: <ol style="list-style-type: none">1. Understand various physicochemical properties of drug molecules in the designing the dosage forms2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations3. Demonstrate use of micromeretic properties in the formulation development and evaluation of dosage forms.4. Understand the viscosity behavior of semisolid dosage forms Explain various physicochemical properties affecting drug performance
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Course Content	
Sr. No.	Description
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

Suggested References:	
Sr. No	References
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.





SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar, Gujarat

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Syllabus with effect from the Academic Year 2022-2023

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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Bachelor of Pharmacy
B.Pharm Semester IV

Course Code	UP04CBPH08	Title of the Course	Pharmacology-I (Practical)
Total Credits of the Course	2	Hours per Week	4

Objectives:	Student would 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
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Course Content	
Sr. No.	Description
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, anesthetics 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 anesthetics by different methods

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





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Suggested References:	
Sr. No	References
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 Mc Graw-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 Physical Pharmaceutics by Ramasamy C, and Manavalan R.
6	Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
7	Modern Pharmacology with clinical Applications, by Charles R. Craig & Robert
8	Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
9	Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan
10	K.D. Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi

