

# GANPAT UNIVERSITY

## FACULTY OF PHARMACY

### TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Pharmacy	Branch/Spec.	B.Pharm.															
Semester	IV																	
Effective from Academic Year	2016-17	Effective for the batch Admitted in										June 2015						
Subject Code	Subject Name	Teaching scheme											Examination scheme (Marks)					
		Credit						Hours (per week)					Theory			Practical		
		Lecture(DT)			Practical (Lab.)			Lecture(DT)			Practical(Lab.)		CE	SEE	Total	CE	SEE	Total
		L	TU	Total	P	TW	Total	L	TU	Total	P	TW						
BPH4A1	Dispensing Hospital and Community Pharmacy	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100
BPH4A2	Organic Chemistry-II	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100
BPH4A3	Pharmaceutical Analysis-II	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100
BPH4A4	Basics in Pharmacology and Therapeutics	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100
BPH4A5	Pharmacognosy-II	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100
<b>Total</b>		15	-	15	10	10	15	-	15	15	5	20	200	300	500	200	300	500

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Semester		IV			Version		2.0.0.0		
Effective from Academic Year			2016-17		Effective for the batch Admitted in			June 2015	
Subject code		BPH4A1	Subject Name		<b>Dispensing Hospital and Community Pharmacy</b>				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	-	2		2	Theory	40	60	100
Hours	3	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome:									
<ul style="list-style-type: none"> <li>By the end of this course, the students shall have good understanding of the basic concepts of formulation, labelling, packing of different types of pharmaceutical dosage forms.</li> <li>Students shall develop ability to work as a community pharmacist as a part of health care system.</li> </ul>									
Theory syllabus									
Unit	Content								Hrs
1	The prescription: Handling of prescription, source of errors in prescription, care, required in dispensing procedures including labelling at dispensed products								02
2	Pharmaceutical calculations: Posology and metrology: Calculations of doses for infants, adults and elderly patients, enlarging and reducing recipes, percentage solutions, allegation, alcohol dilution, proof spirit, isotonic solutions, displacement values, etc								04
3	Principle involved and procedures adopted in dispensing of: Liquid Dosage Forms: Mixtures, solutions like simple solutions, draughts, drops, linctus, syrups, elixirs, enema, inhalation, lotion, liniment, douches, mouthwashes, gargles, throat spray, throat paint, bi-phasic liquid dosage forms; suspensions, emulsions.								14
4	Principle involved and procedures adopted in dispensing of: Solid Dosage Forms: Powder for internal/external use, lozenges and pastilles.								04
5	Incompatibilities Brief discussion on physical and chemical incompatibilities, therapeutics incompatibilities with at least one example.								03
6	Organization and Structure of Hospital and Hospital Pharmacy a. Responsibilities of hospital pharmacist including community service b. Pharmacy and Therapeutic Committee c. Establishment, budget preparation and implementation								03
7	Hospital Formulary: Format, content, preparation and updates, drug information service: sources, procurement, retrieval and computerization of information, poison information, medication error.								04
8	Records And Reports a. Patient historical and medication profile. b. Adverse reactions c. Patient treatment records and auxiliary reporting.								04
9	Drug dispensing and distribution service for all the sectors of hospitals								01
10	Role of pharmacist in pre-packaging services of the hospitals, CSSD services								01

11	Accreditation aspects of hospital services and the rule pertaining to it	01
12	Role of contribution of pharmacist in community towards health care, education, health and hygiene of society in general and patient counselling services.	04
<b>Practical content</b>		
<ul style="list-style-type: none"> <li>The students shall be asked to perform the practical related to the topics mentioned under theory.</li> <li>All the possible practical regarding the topics covered in the theory including following S/S formulations: Ointment, cream, paste eye and ear drops, powders for external use.</li> </ul>		
<b>Text Books</b>		
1	Pharmaceutical Practice by Diana M. Collett and Michale E. Aulton, ELBS Publishers	
2	Dispensing Pharmaceutical for students by Cooper and Gunn, 12 <sup>th</sup> ed. CBS Publishers & Distributors, New Delhi, 2000.	
3	Hospital Organization and management by Kurt Dan and Jonathan S. Ratic, 4 <sup>th</sup> ed. CBS Publishers	
4	Dispensing Pharmaceutical for students by Cooper and Gunn, 12 <sup>th</sup> ed. CBS Publishers & Distributors, New Delhi, 2000.	
5	Pharmaceutical Dispensing by Sharma & Jain.	
6	Dispensing Pharmacy by Hausa.	
7	Hospital Pharmacy: Dr. R. K. Goyal and Parikh, B. S. Shah Publication.	
8	Merchant & Goyal's A Textbook of Hospital Pharmacy: Dr. R. K. Goyal and Parikh, 11 <sup>th</sup> ed., B. S. Shah prakashan, Ahmedabad, 2011.	
<b>Reference Books</b>		
1	Ansel's Pharmaceutical Dosage forms and Drug delivery systems by Allen, Loyd V., 9 <sup>th</sup> ed., Walter Kluwer (India) Pvt. Ltd., New Delhi., 2009.	
2	Pharmaceutical Practice, Edited by A.J. Winfield and R.M.E. Richards, 3 <sup>rd</sup> ed., Edinburgh : Churchill Livingstone, 2004.	
3	Hospital pharmacy by Hassan, Henry, 5th ed., Lea & Febiger, Philadelphia, 1986	
4	Remington: The science and practice of Pharmacy Remington by Reminston, 21 <sup>th</sup> ed. Lippincott W. W., Philadelphia, 2009.	
5	Pharmaceutical Calculations by Ansel ,Howard C.,13 <sup>th</sup> ed., Walter Kluwer (India) Pvt. Ltd., New Delhi., 2009.	

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Semester		IV			Version		2.0.0.0		
Effective from Academic Year			2016-17		Effective for the batch Admitted in			June 2015	
Subject code		BPH4A2	Subject Name		<b>Organic Chemistry-II</b>				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	-	2		2	Theory	40	60	100
Hours	3	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome:									
<ul style="list-style-type: none"> <li>By the end of this course, the student shall have good understanding of basic concept of stereochemistry.</li> <li>Students will able to describe preparation and reaction of important functional groups.</li> </ul>									
Theory syllabus									
Unit	Content								Hrs
1	Stereochemistry Chirality, optical activity, stereoisomerism, nomenclature and associated physicochemical properties, specification of configuration, resolution of racemic mixture, reactions involving stereoisomers, stereo selective and stereospecific reactions, conformations – alkanes and cycloalkanes, chiral reagents, stereochemistry of biphenyls, allenes, and spirans – specification of their configuration								11
2	Structure, properties, nomenclature, preparation and reactions of the following class of functional groups Benzene, polynuclear aromatic compounds, arenes, amines, phenols, aldehydes and ketones, carboxylic acids and their derivatives								30
3	SN1 and SN2 reaction, Neighbouring group effects, catalysis by transition.								4
Practical content									
<ul style="list-style-type: none"> <li>Systematic qualitative analysis of organic compounds and preparation of their derivative such as Acetic acid, p-toluidine, o-cresol, Aniline, Acetophenone, m-Cresol, Benzene, Toluene, Benzaldehyde.</li> <li>Introduction to the use of stereo models.</li> <li>Synthesis of important medicinal agents based on reaction mechanism such as Nitration, Acetylation, Diazotization, etc.</li> <li>Following compounds shall be synthesized. B-Naphthyl acetate, Azo dye, Picric acid etc.</li> </ul>									
Text Books									
1	Organic Chemistry, Robert T. Morrison and Robert N. Boyd, 6th ed., PH I Learning Pvt. Ltd., New Delhi, 2008								
2	Organic Chemistry, Vol I and II by I. L. Finar, 6th ed., Pearson Education, New Delhi, 2000								
Reference Books									
1	Advanced Organic Chemistry, Jerry March, 4th ed., Wiley India, 2007								
2	Organic Chemistry, G. Marc Loudon, 4th ed., Oxford University Press, 2004								

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Semester	IV				Version	2.0.0.0			
Effective from Academic Year	2016-17				Effective for the batch Admitted in	June 2015			
Subject code	BPH4A3		Subject Name		<b>Pharmaceutical Analysis-II</b>				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	-	2		2	Theory	40	60	100
Hours	3	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome:									
<ul style="list-style-type: none"> <li>By the end of this course, the student shall have good understanding of the basic concept of the instrumental analysis and its application of the analysis of the pharmaceutical formulations.</li> <li>Students will be able to carry out the practical handling of the instrumental analysis.</li> </ul>									
Theory syllabus									
Unit	Content							Hrs	
	Following topics should be covered with due consideration of pharmacopoeial applications and numerical								
1	Basics of instrumental analytical methods: Advantages and limitations.							03	
2	Chromatography: Classification, theories, retention mechanism, separation efficiency, methodology and pharmacopoeial applications of column, paper and thin layer chromatography.							12	
3	Electroanalytical methods: Basics of electroanalytical methods.							03	
	Conductometry: Conductance, factors affecting conductance, Kohlrausch law, conductivity cells, applications.							05	
	Potentio and pH metric methods: Standard reduction potentials, various electrodes, electrodes and cell potential, applications of potentiometry and pH metry.							06	
	Polarography, amperometry, biamperometry: Basics of current flow in polarography, dropping mercury electrode, diffusion current, half wave potential, modifications like pulsed and differential pulse polarography, stripping voltametry, biamperometric titrations, amperometric titrations							09	
4	Calorimetry: Types, thermogravimetric analysis, differential scanning calorimetry, differential thermal analysis, melting point, etc. and their applications.							05	
5	Polarimetry: Polarimeter, qualitative and quantitative applications.							02	
Practical content									
<ul style="list-style-type: none"> <li>Quantitative analysis of different compounds involving techniques such as Conductometry, Potentiometry, pH metry, Polarimetry, Column chromatography, Thin layer chromatography, Paper chromatography and Karl – Fischer titration</li> </ul>									
Text Books									
1	Practical Pharmaceutical Chemistry								
2	Pharmaceutical Analysis Part I & II by J. W. Munson								
3	Fundamentals of Analytical Chemistry by Skoog								
4	Text Book of Pharmaceutical Analysis by K. A. Connor								

Reference Books	
1	United State Pharmacopoeia: USP Latest Edition
2	Indian Pharmacopoeia Latest Edition
3	Quantitative chemical analysis by Mendham
4	Instrumental method of analysis by Willard Hobartb H.

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Effective from Academic Year			2016-17		Effective for the batch Admitted in			June 2015	
Subject code		BPH4A4	Subject Name		<b>Basics in Pharmacology and Therapeutics</b>				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	-	2		2	Theory	40	60	100
Hours	3	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome:									
<ul style="list-style-type: none"> <li>At the end of the course, the students would be understand the fundamental concepts of pharmacology and therapeutics and apply it to the actions of most drugs and at clinic.</li> <li>Able to apply the current knowledge of Pharmacy in the best interest of the patients and the community.</li> <li>Students will be able to correlate fundamentals during the management of diseases.</li> </ul>									
Theory syllabus									
Unit	Content							Hrs	
1	Introduction and scope of pharmacology and therapeutics, nature and sources of drugs, nomenclature of drugs, Dosage forms and routes of administration. Define the terms: pharmacology, pharmacotherapeutics, clinical pharmacy, pharmacokinetics, pharmacodynamics, receptor, toxicology, drug, poison, Chemotherapy, Pharmacopoeia, Drug, Medicine, Poison, Drug tolerance, Tachyphylaxis.							4	
2	Pharmacokinetics: (A) Biological membrane, modes of drug transport across cell membrane, Absorption, factors influencing drug absorption, bioavailability, Distribution, volume of distribution, distribution of drugs in fat and redistribution, plasma protein binding, tissue storage, Biotransformation, phase-I& II reactions, microsomal enzyme inhibition, microsomal enzyme induction, Excretion, kinetics of excretion. (B) Area under curve (for single dose and repeated dose), Bioavailability and bioequivalence, Plasma half-life and Clearance, Loading dose and maintenance dose, Therapeutic drug monitoring (TDM) and its significance.							10	
3	Pharmacodynamics: Principles of drug action, biological targets of drug action-enzymes, ion channels, transporters, receptors, receptor occupation theory, signal transduction mechanisms, types of receptors-G-protein couples receptor, inotropic receptors, enzyme linked receptor, nuclear receptor, types of ion channels-gating channels, calcium release channels and store operated calcium channels, Dose response relationship, Combined effect of drugs, Drug antagonism,							10	
4	Basic concepts of pharmacotherapy: a. Recording of medication history, self-medication, non-prescription drug usage, improving Patient compliance and providing patient counseling, Communication skills- Behavioral and interpersonal, with patients and other professionals. b. Drugs used in special population: children, elderly (paediatric and Geriatric considerations) and pregnant women. c. Interpretation of clinical laboratory tests: Haematological, pathological and biochemical							10	

	investigations as markers of Major organ damage and their effect on drug therapy decisions.	
5	Concept of essential drugs and Rational drug use.	2
6	Drug interactions : Causes, mechanisms, types of drug interactions-pharmacokinetic and pharmacodynamic, prescription monitoring, documentation and methods for minimizing clinically relevant drug interactions	3
7	Drug induced diseases, adverse drug reactions and Pharmacovigilance, Pharmacoeconomics	3
8	Clinical Toxicology: Definition of Poison and General Principles of Treatment of Poisoning with particular reference to Barbiturates, Opioids, Organophosphorus, Atropine and Heavy Metal.	3
<b>Practical content</b>		
<ul style="list-style-type: none"> <li>• Introduction to experimental pharmacology and instruments used in experimental pharmacology.</li> <li>• Legal regulations for the use of experimental animals, common laboratory animals, euthanasia of laboratory animals and anesthetics used in animal studies.</li> <li>• Some common and standard techniques for drug administration (intravenous injection, intra gastric administration) &amp; collection of blood samples.</li> <li>• Dose Response Curve (DRC) of Acetylcholine/ Histamine on different animal tissue.</li> <li>• Determination of pD<sub>2</sub> &amp; pA<sub>2</sub> value of Acetylcholine/ Atropine/ Mepyramine on different animal tissue.</li> <li>• Effect of hepatic microsomal enzyme inhibitors and inducers and Experiments on urinary excretion of drugs/their metabolites.</li> <li>• Case studies on basis of prescription interpretation.</li> </ul>		
<b>Text Books</b>		
1	G. Parathsarthee, K. Nyfort-Hansen and M. C. Nahata. A Textbook of Clinical Pharmacy Practice: Essential Concepts and Skills, 2 <sup>nd</sup> Ed., Universities Press, 2012.	
2	K.D. Tripathi, Essential of Medical Pharmacology, 6 <sup>th</sup> Ed., Jaypee Brothers Medical Publisher (P) Ltd., New Delhi, 2008.	
3	R.K. Goyal et al., Elementals of Clinical Pharmacy, 6 <sup>th</sup> Ed., B.S. Prakashan Ahmedabad, 2011-12.	
4	Fundamentals of experimental pharmacology by Ghosh, M.N., 6 <sup>th</sup> ed., Hilton & Company, Kolkatta, 2014.	
5	Kulakarni S.K., Handbook of Experimental Pharmacology, 4 <sup>th</sup> Ed., Vallabh Prakashan, New Delhi, 2012.	
6	Practicals in Pharmacology by R. K. Goyal, 9 <sup>th</sup> ed., B.S. Shah Prakashan, Ahmedabad, 2010.	
<b>Reference Books</b>		
1	Goodman & Gilman's, The Pharmacological basis of therapeutics, 12 <sup>th</sup> Edition, Mc Graw Hill, New Delhi, 2011.	
2	Rang, H.P. & Dale, M.M., Rang and Dale's Pharmacology. 7 <sup>th</sup> ed., Elsevier Churchill Living stone, London, 2012.	
3	Basic and clinical pharmacology by Katzung, B.G., 12 <sup>th</sup> ed., Mc Graw Hill, New Delhi, 2009.	
4	Brian R. Walker et al., Davidson's Principle and Practice of Medicine, 22 <sup>nd</sup> ed., Churchill Livingstone, Edinburgh, 2014.	
5	Joseph T. Dipiro et al., Pharmacotherapy: A Pathophysiological Approach, 9 <sup>th</sup> ed., Mc Graw-Hill Education, 2014.	
6	Satoskar, R.S. and Bhadarkar, S.D., Pharmacology and Pharmacotherapeutics, 21 <sup>st</sup> ed., Popular Prakashan, Mumbai, 2010.	
7	Richard A. Harvey et al., Pharmacology (Lippincott Illustrated Reviews Series), 5 <sup>th</sup> Ed. Lippincott- Raven Company, Philadelphia, New York, 2011.	



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Semester	IV				Version	2.0.0.0			
Effective from Academic Year	2016-17				Effective for the batch Admitted in	June 2015			
Subject code	BPH4A5		Subject Name		<b>Pharmacognosy -II</b>				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	-	2		2	Theory	40	60	100
Hours	3	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome:									
<ul style="list-style-type: none"> <li>Students get acquainted with sources, chemistry, identification tests and important uses of crude drugs having pharmaceutical and commercial significance of above objective class of drugs.</li> <li>Students acquire the skill of identification of adulteration in crude drugs and application of quality control methods of crude drugs.</li> </ul>									
Theory syllabus									
Unit	Content							Hrs	
1	Resins : General definitions, classification and physicochemical properties of resins, Study of drugs containing resins and resins combination like Podophyllum, Jalap, Capsicum, Myrrh, Asafoetida, Benzoin, Turmeric, Ginger.							07	
2	Tannins : General definitions, classification and physicochemical properties of tannins. Study of tannins containing drugs like Gall, Gambier, Black catechu							05	
3	Volatile Oils : General definitions, classification and physicochemical properties of volatile oil. General methods of obtaining volatile oils from plants, Study of crude drugs and volatile oils of Mentha, Coriander, Cinnamon, Cassia, Lemon and Orange peel, Lemon grass, Caraway, Dill, Clove, Fennel, Cumin, Nutmeg, Eucalyptus, Chenopodium, Cardamom, Valerian, Sandal wood.							12	
4	Quality control of crude drugs: Adulteration of crude drugs and their detection by organoleptic, morphological, microscopical, physical, chemical, biological and other method of evaluation of crude drugs.							07	
5	Enzymes: Biological sources, preparation, identification test and uses of following Diastase, Papain, Pepsin, Trypsin, Pancreatin							04	
6	Natural allergens, photosensitizing agents & fungal toxins							03	
7	Plant Sweeteners & natural colorants							03	
8	Marine Pharmacognosy – Studies on novel natural products from marine source							04	
Practical content									
<ul style="list-style-type: none"> <li>Identification of crude drugs belongs to tannins and resins by morphology and chemical tests.</li> <li>Microscopic studies of crude drugs and their powders belongs to class of volatile oils.</li> <li>Microscopic measurements of cell and cell contents: starc, calcium oxalate crystals and phloem fibres.</li> <li>Measurement of leaf constants such as stomatal number, stomatal index, vein islet number, vein termination number, palisade ratio.</li> </ul>									
Text Books									
1	Pharmacognosy; C. K. Kokate, A. P. Purohit, S. B. Gokhale; Nirali prakashan, Pune; 39 <sup>th</sup> Edition; 2007.								

2	A Text book of pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, 13 <sup>th</sup> edition, 2007-08.
3	Textbook of Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors, New Delhi, 5 <sup>th</sup> Edition, reprinted, 2003.
4	Textbook of Pharmacognosy and Phytochemistry, Biren Shah and A K. Seth, Elsevier Publication, 1 <sup>st</sup> edition 2010.
Reference Books	
1	Pharmacognosy: V. E. Tyler, L. R. Brady, J. E. Habbers, Lea and Febiger Philadelphia, 9 <sup>th</sup> Edition, 1988.
2	Trease and Evan's Pharmacognosy; W. C. Evans; W. B. Saunders Co., Singapore; 15 <sup>th</sup> Edition; 2008.