

GANPAT UNIVERSITY

FACULTY OF PHARMACY

TEACHING AND EXAMINATION SCHEME

Programme	Bachelor of Pharmacy	Branch/Spec.	B.Pharm.																
Semester	VI																		
Effective from Academic Year	2017-18	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	Total						
BPH6A1	Pharmaceutical Biotechnology	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100	
BPH6A2	Pharmaceutical Technology-II	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100	
BPH6A3	Biochemistry-II	3	-	3	2	2	3	-	3	3	1	4	40	60	100	40	60	100	
BPH6A4	Medicinal Chemistry-I	4	-	4	2	2	4	-	4	3	1	4	40	60	100	40	60	100	
BPH6A5	Pharmacognosy-IV	2	-	2	2	2	2	-	2	3	1	4	40	60	100	40	60	100	
Total		15	-	15	10	10	15	-	15	15	5	20	200	300	500	200	300	500	

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FACULTY OF PHARMACY									
Programme	Bachelor of Pharmacy				Branch/Spec.	B.Pharm.			
Semester	VI				Version	2.0.0.0			
Effective from Academic Year		2017-18			Effective for the batch Admitted in			June 2015	
Subject code	BPH6A1		Subject Name		PHARMACEUTICAL BIOTECHNOLOGY				
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"> The course will help the students to have basic understanding of microbial genetics and gene transfers among microbes The student will understand the basic working and application of enzymes used in industry The students will understand the applications of molecular biology techniques, fermentation and Immunology in treatment of various molecular diseases and immunological disorders 									
Theory Syllabus									
Unit	Content								Hrs
1	Introduction to biotechnology								02
2	Genetic recombination: a. Transformation, conjugation and transduction b. Mutation, types of mutation, mutants, methods for detection of mutants c. Protoplast fusion, Gene cloning & its applications, Development of hybridoma for monoclonal antibodies d., Gene cloning and its applications. study of drugs produced by biotechnology, viz. activase, humulin, Hepatitis B, Interferon etc.								14
3	Immunology and Immunological Preparations: a. Principles of immunity and immune system, Nonspecific defense mechanisms of the body. Study of antigens, haptens and types of antibodies, cellular & humoral immunity, antigen-antibody reactions and their applications b. Active and passive immunization techniques, Vaccines, their preparation, standardization and storage. A brief study of vaccines like diphtheria, tetanus toxoid, cholera, pertussis, plaque, BCG, rabies, polio, measles, typhoid, new generation vaccines-hepatitis, AIDS, Malaria c. Diagnostic preparations, brief study of sera.								12
4	Fermentation Techniques: a. Screening of soil for organisms producing antibiotics, isolation and preservation of master culture, mutants and factors influencing rate of mutation b. Design of fermenter, control of different parameters, media used for fermentation, sterilization of fermenter, media and air c. Isolation of fermentation products. Detailed production of <ol style="list-style-type: none"> selected antibiotics: penicillin, streptomycin, tetracycline vitamin B₁₂, Riboflavin others: citric acid, alcohol 								12
5	Immobilization of Enzymes: Techniques of immobilization, Factors affecting enzyme kinetics, Applications of Enzymes								05
Practical contents									
1	Practicals related to topics covered in theory shall be carried out. Experiments on Preparation of various media, sub-culturing techniques, staining techniques, isolation of microorganisms, evaluation of disinfectants, sterility testing of pharmaceutical products, etc. shall be carried out. Experiments on antibiotics resistant mutant selection, vaccines preparations as per IP, Fermentation of carbohydrates and nitrate reduction test, Fermentative production of alcohol, citric acid, etc. shall be carried out.								

References	
1	Textbook of microbiology by Tortora G.J., eighth edition, Pearson education, New Delhi, 2004
2	Industrial microbiology by Prescott and Dunn, fourth edition, CBS Publishers & Distributers, New Delhi, 1987.
3	Principles of fermentation technology. by P. F. Stanbury, A. Whiteshaker, 2nd edition, Elsevier Publisher, New Delhi, 2005.
4	Microbiology, by Pelczar, Michael J. fifth edition, Tata McGraw Hill, New Delhi, 2002.
5	Industrial microbiology by Casida, L.E., eighth edition. New age international publishers, New Delhi, 1996.
6	Industrial Microbiology by A.H.Patel, first edition, Macmillan India Ltd., 1985
7	A Text book of Biotechnology by R.C.Dubey, revised edition, S.Chand& company Ltd., New Delhi, 2006.
8	Pharmaceutical Biotechnology by S.P.Vyas&V.K.Dixit, first edition, CBS Publishers & Distributors, New Delhi, 1998
9	Pharmaceutical Biotechnology by K. Sambamurthy&AshutoshKar, first edition, New Age International Publishers, 2006.
10	Immunology by Roitt, Brostoff and Male, sixth edition, Mosby-Year Book Europe Limited, London, 2001.
11	Immunology and Immunotechnology by Ashim K. Chakravarty, first edition, Oxford University press, New Delhi, 2006.
12	Remington: The science and practice of Pharmacy Remington by Reminston, twenty first edition, Lippincott Williams & Wilkins., Philadelphia, 2009.

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Semester		VI			Version		2.0.0.0		
Effective from Academic Year			2017-18		Effective for the batch Admitted in			June 2015	
Subject code		BPH6A2		Subject Name		PHARMACEUTICAL TECHNOLOGY-II			
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"> To provide basic understanding of general formulation like tablets, capsule used in treatment of various diseases The course will help students to understand the types of cosmetics and its manufacturing used in cosmetic industries 									
Theory Syllabus									
Unit	Content								Hrs
1	<p>Tablets:(a) Definition, Advantages and disadvantages, Introduction to types of tablets (b) Formulation of tablets diluents, disintegrants, binder, adsorbent, lubricants, anti-adherents, glidants, organolaptic additives: colors, flavours and sweetening agents, co processed excipients (c) Granulation methods and its influence on physical and mechanical properties, compression behaviour, Direct compression, machinery for large scale granulation and compression, physics of tablet making, In process controls, processing problems and remedies, (d) Evaluation (Pharmacopoeial and non-pharmacopoeial tests) of various tablet formulations with special emphasis on dissolution curve comparison (e) Coating of Tablets: objectives, types of coating, film forming materials, formulations of coating solution, equipments for coating, coating process, evaluation of coated tablets ,defects of coated tablets and their remedies. Specialized coating processes. (f) Pharmaceutical Tablet Compression Tooling: Terminology, tablet design, specification and information required, use and care of the tooling, Objectives, theory, process of compression, effect of compression force on powders/granules. Kawakita equations. Applications in tablet dosage forms (direct compression, etc.) Hecker and Kawakita equations.</p>								20
2	<p>Capsules: Hard gelatin capsules: Definitions, Advantages, disadvantages, Ideal requirements, Production of Hard capsules (Gelatin and nongelatin e.g. vegetable), Capsule storage, size of capsules, formulation and methods of capsule filling, problems and remedies, quality control, climatic control in capsule department. Soft gelatin Capsules: Formulation of shell and sealing, quality control with special emphasis on current dissolution testing.</p>								10
3	<p>Cosmeticology and cosmetic preparations: Fundamentals of cosmetic science, structure and functions of skin and hair, formulation, preparation and packaging of cosmetics for skin - Sunscreen, moisturizers, cold cream, and vanishing cream, hair - Shampoo and conditioners, dentifrice- powders, gels, paste and manicure preparations like- nail polish, lipsticks, eye lashes, brief introduction to cosmaceuticals, baby care products, shaving cream, hygienic products.</p>								09
4	<p>Pharmaceutical Packaging: Definition, Packaging components, types, specifications and methods of evaluation, stability aspects of packing. Primary and secondary packaging, packaging materials, containers and closures; and tamper-evident packaging, packaging equipments. Regulatory requirements in pharmaceutical packaging.</p>								06
Practical contents									
Practical shall be conducted from the topics covered in theory explaining the principle involved in formulation and evaluation of tablet, capsule and cosmetic preparations etc..									

References	
1	Pharmaceutical dosage forms and drug delivery systems by Ansel& others, ninth edition, Lippincott Williams & Wilkins, New York, 2005.
2	Pharmaceutics: The Science of Dosage Form Design by Michael E. Aulton, second edition, Churchill Livongstone, 1988.
3	Pharmaceutical Dosage Forms: Tablets, second edition, vol.1, 2 and 3 by H.A. Lieberman, Leon Lachman and Joseph B. Schwartz, Marcel Dekker Inc., New York, 1989.
4	Cosmetics by W.A. Poucher, tenth edition, edited by Hilda Butler
5	Cosmetics: Science and technology by Marvin S. Balsam and Edward Sagarin, second edition, Vol. 1, 2, and 3 Wiley Interscience Publication, New York, 1974
6	Textbook of Cosmetics by M. Vimaladevi, first edition, CBS Publishers & Distributors, New Delhi, 2005
7	The Theory and Practice of Industrial Pharmacy by Leon Lachman, H Lieberman & J Kanig, third edition, Varghese Publishing House, Bombay,1986.
8	Remington: The science and practice of Pharmacy Remington by Reminston, twenty first edition, Lippincott Williams & Wilkins., Philadelphia, 2009.
9	Pharmacopoeia : I.P., U. S. P., B.P

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Semester		VI			Version		2.0.0.0		
Effective from Academic Year				2017-18		Effective for the batch Admitted in			June 2015
Subject code		BPH6A3		Subject Name		Biochemistry-II			
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									
The students are expected to									
<ul style="list-style-type: none"> • Learn the biochemistry aspects specifically, the metabolism, gene code in protein formation, chemistry basic information regarding DNA and its replication, RNA types and its transcription and translation ect. • Understand basic idea of enzymes, and different types of metabolism take place in to the body. • Understand concept of chemistry of living systems which will further help in understanding of drug interaction in the body, drug protein binding, enzyme inhibition etc. 									
Theory Syllabus									
Unit	Content								Hrs
1.	Introduction to Lipid Lipid Metabolism: Oxidation of fatty acids, Beta-oxidation and energetic, Alpha-oxidation, Omega-oxidations, Biosynthesis of ketone bodies and their utilization, Biosynthesis of fatty acids, Control of lipid metabolism and Metabolism of cholesterol.								08
2.	Introduction to Proteins/Amino acids Definitions, Classifications, Biological importance, Color reactions, Structure of protein, Protein denaturation, Properties of amino acids, Separation and identification of amino acids, Methods for determination of N and C terminal amino acids, Methods for determination of primary structure of protein/peptide, Essential amino acids and peptides								08
3.	Protein/Amino acid metabolism General concept of amino acid metabolism, Amino acid pool, Transamination, Deamination, Biosynthesis of amino acids, Catabolism of amino acids with diseases involves, Conversion of amino acids to specialized products or products with biological importance with diseases, Urea cycle, Metabolic disorders of urea cycle								06
4.	Nucleic acid and Nucleotides: Introduction, functions, structure of nucleotides, structure of DNA and RNA, types of RNA, biosynthesis and degradation of purine and pyrimidine nucleotides with disorders.								08
5.	Enzymes								05
6.	Molecular biology: DNA replication, recombination, DNA damage and repair, transcription, Translation, Genetic code and mutation, Recombinant DNA technology, Regulation of gene expression.								07
7.	Body fluids & organ functions test								03
Practical content									
1.	Practicals based on analysis of lipids								
2.	Colorimetric analysis of glucose, creatinine and urea in blood; determination of glucose, calcium, total protein, bilirubin and cholesterol in plasma; estimation of GOD-POD, SGPT, SGOT								
3.	Qualitative and quantitative estimation of amino acids, titration curve of amino acid, Separation of amino acids by paper chromatography and TLC.								

References	
1.	Biochemistry by U. Satyanarayana, Books and Allied (P) Ltd., Calcutta, Latest Edition.
2.	Fundamentals of Biochemistry by Dr. A. C. Deb, Latest edition.
3.	Textbook of Biochemistry by Dr. Ramarao, Latest edition.
4.	Textbook of Biochemistry by Dr. K. Rambabu, Latest edition.
5.	Text book of Medical Biochemistry by S. Ramkrishnan, K. G. Prasannan, Orient Longman, Madras.
6.	Principles of Biochemistry by G. F. Zubay, W. W. Parson and D. E. Vance, WBC Publishers, England, Latest Edition.
7.	Biochemistry by S. C. Rastogi, Tata McGraw Hill, New Delhi, Latest Edition.
8.	Outlines of Biochemistry by E. E. Conn and P. K. Stumpf, John Wiley and Sons, New York.
9.	Principles of Biochemistry by A. L. Lehninger, CBS Publishers and Distributors.
10.	Harper's Biochemistry Edited by R. K. Murry, D. K. Granner, P. A. Mayes and V. W. Rodwell, Prentice Hall International Inc., Latest Edition.
11.	Introductory Practical Biochemistry by R. Singh and S. K. Sawhney, Narosa Publishing House, New Delhi, 2002.
12.	An Introduction to Practical Biochemistry by D. T. Plummer,, Tata McGraw Hill, New Delhi.
13.	Laboratory manual in Biochemistry, J. Jayaraman, Wiley eastern Ltd., New Delhi.
14.	Practical Biochemistry by R. K. Goyal, Latest Edition.

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Programme		Bachelor of Pharmacy			Branch/Spec.		B.Pharm.		
Semester		VI			Version		2.0.0.0		
Effective from Academic Year			2017-18		Effective for the batch Admitted in			June 2015	
Subject code		BPH6A4		Subject Name		Medicinal Chemistry-I			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	4	-	2		2	Theory	40	60	100
Hours	4	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome									
<ul style="list-style-type: none"> By the end of this course, the student should have a good understanding of the history and basic concepts of Medicinal chemistry. Students should be able to describe in detail synthetic approaches, mechanisms of action as well as structure activity relationship of some important therapeutic class of Drugs 									
Theory Syllabus									
Unit	Content								Hrs
1	An introduction to medicinal chemistry, History and development, Drug therapy								02
2	Physiochemical properties of drug molecules influencing biological activity: Solubility, Partition coefficient, Hydrogen bonding, Complexation, Ionisation, Redox potential, Surface activity and protein binding, bio-isosterism								10
3	Drugs acting on respiratory tract: a. Antiasthmatics b. Expectorants c. Antitussive d. Respiratory stimulants e. Mucolytics f. Decongestants								06
4	Drugs acting on gastrointestinal tract : a. Antacids b Antisecretary (Ranitidine) c. Proton pump inhibitors (Omeprazole) d. Antiemetics e. Antidiarrheals f. Laxatives g. Prokinetics h. Antispasmodics & drug modifying intestinal motility i. Drugs for irritable bowel syndrome j. Local colorectal preparations k. Enzymes, carminatives &hepatobiliary agent								07
5	Autocoids <ul style="list-style-type: none"> Histamines and antihistamines: Histamine receptors, H1antagonists, H2 antagonists Synthesis: tripelenamine, chlorcylclizine, trimeprazine, chlorpheniramine, promethazine, cyproheptadine, antazoline, cetirizine Eicosanoids: history and discovery, eicosanoids biosynthesis, drug action mediated by eicosanoids, eicosanoids approved for human clinical use 								08
6	Drug Acting on ANS <ul style="list-style-type: none"> Cholinergics: SAR- Acetylcholine mimetics- Muscarinic agonists Anticholinergics: SAR:-Acetylcholine , antagonists- Muscarinic antagonists, Synthesis:- Neostigmine, Dcycloimine hydrochloride, glycopyrronium bromide. Adrenergics: SAR: Phenylethanolamines, Synthesis: Adrenaline, Dopamine, Isoprenaline Ephedrine Adrenergic antagonists: Synthesis: Naphazoline, Salbutamol Neuromuscular blocking agents and ganglionic blockers 								11
7	Drugs Acting on CNS: <ul style="list-style-type: none"> CNS stimulants: Analeptics, Antidepressants, hallucinogens SAR:- Tricyclic antidepressants Synthesis:- Amphetamine, Nikethamine, Fluoxetine CNS Depressants: General and local anesthetics, Sedative and hypnotics, Anxiolytics, Antiepileptics, Antipsychotics, SAR:- Benzoic acid and Aniline derivatives with Local anesthetic Barbiturates, Benzodiazepines, Phenothiazines, Butyrophenones Synthesis:- Halothane, Lignocaine, Procaine, Benzocaine, Thiopental sodium, phenobarbitone, Chlordiazepoxide, Meprobamate, Phenytoin, Sodium valproic acid, Ethosuximide, Lurasidone, Parampanel. 								16
Practical content									
1.	Organic spotting of solid-solid binary mixtures including eutectic mixture.								

2.	Synthesis of some organic compounds including some heterocyclic compounds.
References	
1.	Textbook of Organic Medicinal and Pharmaceutical Chemistry, Wilson and Giswolds J. Lippincott Co. Philadelphia.
2.	Principles of medicinal chemistry, W. C. Foye, Lea and febiger, Philadelphia.
3.	Burgers Medicinal chemistry, H. E. Wolff, John Wiley and sons, New York
4.	Strategies for organic drug synthesis and design, Daniel Lednicer, John Wiley and Sons USA

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Programme		Bachelor of Pharmacy			Branch/Spec.	B.Pharm.			
Semester		VI			Version	2.0.0.0			
Effective from Academic Year			2017-18		Effective for the batch Admitted in		June 2015		
Subject code		BPH6A5	Subject Name		Pharmacognosy IV				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	2	-	2		2	Theory	40	60	100
Hours	2	-	3	1	4	Practical	40	60	100
Pre-requisites:									
Nil									
Learning Outcome									
<ul style="list-style-type: none"> Students get acquainted with sources, cultivation techniques, identification techniques and important uses of alkaloidal drugs for future reference. 									
Theory Syllabus									
Unit	Content							Hrs	
	Sources, Cultivation, Collection, Processing, Commercial Varieties, Chemical Constituents, Substitutes, Adulterants, Uses, Diagnostic Macroscopic & Microscopic Features & Specific Chemical Tests of Following Alkaloid Containing Drugs.								
1	Definition, properties, classification, identification and therapeutics of Alkaloids.							04	
2	Pyridine – Piperidine: <u>Tobacco</u> , Areca, Lobelia, Hemlock							03	
3	Tropane: <u>Datura</u> , Belladonna, Hyocyamus, <u>Withania</u> , Dubosia, Coca							06	
4	Quinoline&Isoquinoline: <u>Cincona</u> , <u>Ipecac</u> , Opium, Camptothecia							04	
5	Indole: Ergot, <u>Rauwolfia</u> , <u>Catharanthus</u> , <u>Nuxvomica</u> , Physostigma							05	
6	Imidazole: Pilocarpus							01	
7	Steroidal: Veratrum, <u>Kurchi</u>							01	
8	Alkaloidal Amine: <u>Ephedra</u> , Colchicum							02	
9	Purines: Coffee, Tea, Cola							02	
10	Quinazoline: <u>Vasaka</u>							01	
11	Diterpene Alkaloids: Aconite							01	
Practical content									
1	Morphology of crude drugs containing Alkaloids mentioned in theory.								
2	Histological Study of Alkaloidal drugs mentioned in theory.								
References									
1	Pharmacognosy; C. K. Kokate, A. P. Purohit, S. B. Gokhale; NiraliPrakashan, Pune; 39 th Edition; 2007.								
2	Pharmacognosy; V. E. Tyler, L. R. Brady, J. E. Habbers, Lea and Febiger Philadelphia, 9 th Edition, 1988.								
3	A Text book of pharmacognosy: C. S. Shah, J. S. Quadry, B. S. Shah Prakashan, Ahmedabad, 13 th revised edition, 2007-08.								
4	Trease and Evan's Pharmacognosy; W. C. Evans; W. B. Saunders Co., Singapore; 15 th Edition; 2008.								
5	Textbook of Pharmacognosy: T.E. Wallis, CBS Publishers and Distributors, New Delhi, 5 th Edition, reprinted, 2003.								
6	Textbook of Pharmacognosy and Phytochemistry, Biren Shah and A K. Seth, Elsevier Publication, 1 st Edition, 2010.								
7	Cultivation and Utilization of Medicinal Plants. Edited by C.K. Atal and B.M. Kapoor Regional Research Laboratory, Jammu- Tawi, 1982.								
8	Practical Pharmacognosy; Kokate C.K., VallabhPrakashan, Delhi.								
9	Chemistry of Organic Natural Products, Vol. I and II, O. P. Agrawal, Goel Publishing House, 31 st Edition, 2005.								