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: III

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	UP03CBPH01	Pharmaceutical Organic Chemistry II – Theory	4	4	3	25/10	75/30	100/40
	UP03CBPH02	Physical Pharmaceutics -I –Theory	4	4	3	25/10	75/30	100/40
	UP03CBPH03	Biochemistry – Theory	4	4	3	25/10	75/30	100/40
	UP03CBPH04	Pharmaceutical Jurisprudence – Theory	4	4	3	25/10	75/30	100/40
	UP03CBPH05	Pathophysiology – Theory	4	4	3	25/10	75/30	100/40
	UP03CBPH06	Pharmaceutical Organic Chemistry II – Practical	2	4	4	15/6	35/14	50/20
	UP03CBPH07	Physical Pharmaceutics -I Practical	2	4	4	15/6	35/14	50/20
	UP03CBPH08	Biochemistry –Practical	2	4	4	15/6	35/14	50/20
		Total:	**26**	**-**	**-**	**170**	**480**	**650/260**

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Bachelor of Pharmacy
B.Pharm Semester III

Course Code	UP03CBPH01	Title of the Course	Pharmaceutical Organic Chemistry - II -Theory
Total Credits of the Course	4	Hours per Week	3 + 1 (Tutorial)

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

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	Description	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 substituted benzene compounds towards electrophilic substitution reaction D. Structure and uses of DDT, Saccharin, BHC and Chloramine	**10**
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	**08**
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	**07**

Suggested References:	
Sr. No	**References**
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.

Bachelor of Pharmacy
B.Pharm Semester III

Course Code	UP03CBPH02	Title of the Course	Physical Pharmaceutics - I -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 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. 4. Surface and interfacial phenomena in formulation of drug products

Course Content		
Unit	**Description**	**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 in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols–inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid- crystalline, amorphous & polymorphism. **Physicochemical properties of drug molecules** Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications	**12**
3	**Surface and interfacial phenomenon** Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient,	**08**

	adsorption at liquid interfaces, surface active agents, HLB Scale, solubilization, detergency, adsorption at solid interface	
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.	**08**
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.	**07**

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.
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 Phramacy, by Gaurav Jain & Roop K. Khar

Bachelor of Pharmacy
B.Pharm Semester III

Course Code	UP03CBPH03	Title of the Course	Biochemistry -Theory
Total Credits of the Course	4	Hours per Week	3 + 1 (Tutorial)

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 shell able to: 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. 2. Understand the metabolism of nutrient molecules in physiological and pathological conditions. 3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. 4. Understand the pathway of lipid metabolism and its mechanism

Course Content		
Unit	**Description**	**Hours**
1	• **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	**08**
2	• **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	**10**

	• **Biological oxidation** Electron transport chain (ETC) and its mechanism, Oxidative phosphorylation & its mechanism and substrate level, phosphorylation Inhibitors ETC and oxidative phosphorylation/ Uncouplers	
3	• **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 (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia), Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline, Catabolism of heme; hyperbilirubinemia and jaundice	**10**
4	• **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	• **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 Coenzymes – Structure and biochemical functions	**07**

Suggested References:	
Sr. No	**References**
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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Bachelor of Pharmacy
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Course Code	UP03CBPH04	Title of the Course	Pharmaceutical Jurisprudence Theory
Total Credits of the Course	4	Hours per Week	3+1(Tutorial)

Scope:	This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India. Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.
Objectives:	Student would be able to: 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.

Course Content		
Units	**Description**	**Hours**
1	**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	**10**
2	**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.	**10**

	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	**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 **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. **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	**10**
4	**Study of Salient Features of Drugs and Magic Remedies Act and itsrules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties **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 **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)	**08**
5	**Pharmaceutical Legislations** – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee **Code of Pharmaceutical ethics:** Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath **Medical Termination of Pregnancy Act** **Right to Information Act** **Introduction to Intellectual Property Rights (IPR)**	**07**

Suggested References:	
Sr. No	**References**
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)
10	Pharmaceutical Jurisprudence by T. P. Gopinathan
11	Pharmaceutical Jurisprudenceby Basavaraj K. Nanjwade and Gurudev M. Hiremath
12	Forensic pharmacy by B S. Dr. Kuchekar, A M. Mr. Khadatare, Sachin C., Mr. Itkar

Bachelor of Pharmacy
B.Pharm Semester III

Course Code	UP03CBPH05	Title of the Course	Pathophysiology Theory
Total Credits of the Course	4	Hours per Week	3+1 (Tutorial)

Scope:	The scope of Pathophysiology is to unravel the altered biological (i.e., physical and chemical) processes in our organism that precede, accompany, or follow certain disorders or diseases.
Objectives:	Student would be able to: 1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases 3. Mention the complications of the diseases. 4. Learn the mechanism and treatments of diseases related to all organ systems of human body.

Course Content		
Unit	**Description**	**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 **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	**10**
2	**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	**Haematological Diseases:** Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalassemia, hereditary acquired anemia, hemophilia **Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones **Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.	**10**
4	**Gastrointestinal system:** Peptic Ulcer, Inflammatory bowel diseases, jaundice, hepatitis (A, B, C, D, E, F) alcoholic liver disease. **Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout **Principles of Cancer:** Classification, etiology and pathogenesis of Cancer	**08**
5	**Infectious diseases:** Meningitis,Typhoid, Leprosy, Tuberculosis Urinary tract infections **Sexually transmitted diseases:**AIDS, Syphilis, Gonorrhea	**07**

Suggested References:	
Sr. No	**References**
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.
Recommended Journals:	

- The Journal of Pathology. ISSN: 1096-9896 (Online)
- The American Journal of Pathology. ISSN: 0002-9440
- Pathology. 1465-3931 (Online)
- International Journal of Physiology, Pathophysiology and Pharmacology. ISSN: 1944-8171 (Online)
- Indian Journal of Pathology and Microbiology. ISSN-0377-4929

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Course Code	UP03CBPH06	Title of the Course	Pharmaceutical Organic Chemistry II – (Practical)
Total Credits of the Course	2	Hours per Week	4

Objectives:	Student would be able to: 1. Understand various techniques like distillation and crystallization 2. Standardization methodology of various chemicals 3. Preparation technique of various compounds 4. Experimental Skill of synthesis of various compounds

Course Content	
Sr. No.	**Description**
1	I Experiments involving laboratory techniques • Recrystallization • Steam distillation
2	II Determination of following oil values (including standardization of reagents) • Acid value • Saponification value • Iodine value
3	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 / Nitrobenzene 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-napthol from Aniline by diazotization and coupling reactions. • Benzil from Benzoin by oxidation reaction. • Dibenzal acetone from Benzaldehyde by Claison Schmidt reaction • Cinnammic acid from Benzaldehyde by Perkin reaction • P-Iodo benzoic acid from P-amino benzoic acid

Suggested References:	
Sr. No	**References**
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.

Bachelor of Pharmacy
B.Pharm Semester III

Course Code	UP03CBPH07	Title of the Course	Physical Pharmaceutics-I (Practical)
Total Credits of the Course	2	Hours per Week	4

Objectives:	Student would be able to: 1. Understand the behavior of physical state in drug development 2. Explain various physicochemical properties affecting drug performance 3. Application of stability knowledge in drug storage 4. Application of Complexation phenomena in dosage form development

Course Content	
Sr. No.	**Description**
1	Determination the solubility of drug at room temperature
2	Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3	Determination of Partition co- efficient of benzoic acid in benzene and water
4	Determination of Partition co- efficient of Iodine in CCl_4 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

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.
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 Phramacy, by Gaurav Jain & Roop K. Khar

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Course Code	UP03CBPH08	Title of the Course	Biochemistry (Practical)
Total Credits of the Course	2	Hours per Week	4

Objectives:	Student would be able to: 1. Understand the method of analysis of various macromolecules 2. Determination of various blood constituents 3. Study the enzyme activities and its role in metabolism 4. Understanding of operating various analytical instruments

Course Content	
Sr. No.	**Description**
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.

Suggested References:	
Sr. No	**References**
1	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.