

SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR



M. Sc.
PHARMACEUTICAL CHEMISTRY
SYLLABUS EFFECTIVE FROM: 2017-18
Semester: I

Paper Code : PS01CPCH21	Total Credits : 4
Title of paper: Chemistry of Life	

Unit	Description in detail	Weightage (%)
I	<p>Introduction: Introduction to bio chemistry, water as a biological solvent, weak acid and bases, pH, buffers, Hinderson-Hasselbalch equation, physiological buffers, fitness of the aqueous environment for living organisms.</p> <p>Carbohydrate: Structure of monosaccharides. Stereoisomerism and optical isomerism of sugars. Reaction of aldehyde and ketone groups. Ring structure and anomeric forms, mutarotation. Reactions of sugar due to hydroxyl groups. Important derivatives of monosaccharides, disaccharides and trisaccharides (structure, occurrence and functions of important ones). Structure, occurrence and biological importance of monosaccharides, oligosaccharides and polysaccharides e.g. Cellulose, chitin, agar, algenic acids, pectins, proteoglycans, sialic acids, blood group polysaccharides, glycogen and starch. Bacterial cell wall polysaccharides etc. Glycoproteins</p>	25
II	<p>Lipids-: Definition and classification. Fatty acids: introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids, prostaglandins.</p> <p>Triacylglycerols: nomenclature, physical properties, chemical properties and characterization of fats - hydrolysis, saponification value, rancidity of fats, Reichert-Meissel number and reaction of glycerol. Biological significance of fats. Glycerophospholipids (lecithins, lysolecithins, cephalins, phosphatidyl serine, phosphatidyl inositol, plasmalogens), sphingomyelins, glycolipids - cerebrosides, gangliosides. Properties and functions of phospholipids, isoprenoids and sterols.</p>	25

III	<p>Proteins Introduction, classification based on solubility, shape, composition and functions. Amino acids: common structural features, stereo-isomerism and RS system of designating optical isomers, classification and structures of standard amino acids as zwitterion in aqueous solutions, physical and chemical properties, titration of amino acids, separation of amino acids. Essential amino acids. Peptides: structure Of peptide bond, chemical synthesis of polypeptides</p>	25
	<p>- protection and deprotection of N-terminal, and C-terminal ends and functional groups in the side-chains, formation of peptide bonds, condensing agents, strategy of chemical synthesis, Merrifield solid-phase peptide synthesis. Determination of the amino acid sequence of a polypeptide chain, specific chemical and enzymatic cleavage of a polypeptide chains and separation of peptides. Protein structure: levels of structure in protein architecture, primary structure of proteins, secondary structure of proteins - helix and pleated sheets, tertiary structure of proteins, forces stabilizing the tertiary structure and quaternary structure of proteins. Denaturation and renaturation of proteins. Behaviour of proteins in solutions, salting in and salting out of proteins. Structure and biological functions of fibrous proteins (keratins, collagen and elastin), globular proteins (hemoglobin, myoglobin), lipoproteins, metalloproteins, glycoproteins and nucleoproteins.</p>	
IV	<p>Nucleic acids Nature of genetic material; evidence that DNA is the genetic material, Composition of RNA and DNA, generalized structural plan of nucleic acids, nomenclature used in writing structure of nucleic acids, features of DNA double helix. Denaturation and annealing of DNA, structure and roles of different types of RNA. Size of DNA in procaryotic and eucaryotic cells, central dogma of molecular biology, Gene, genome, chromosome.</p>	25

Basic Text & Reference Books:

1. David L. Nelson, Michael M. Cox Lehninger's, *Principles of Biochemistry Fourth Edition*.
2. C.C.Chatterjee, *Human Physiology*, (Vol: I & II); Medical Allied Agency, Kolkatta.
3. Tortora Derrickson, *Principles of Anatomy and Physiology*; Publsiher: Wiley International; ISBN- 13:978-0-471-68934-3
4. Trease and Evans, *Pharmacognosy* ; Publisher: Saunder(Elsevier); ISBN-13: 978-81-312-0087-2; ISBN-10: 81-312-0087-6.
5. T. E. Wallis, *Pharmacognosy* ; CBS Publisher (New Delhi); ISBN:81-239-0886-5.

SARDAR PATEL UNIVERSITY
Programme : M. Sc. PHARMACEUTICAL CHEMISTRY
Semester : I
Syllabus Effective From : June 2017

Paper Code : PS01CPCH22	Total Credits : 4
Title of paper : Organic Chemistry I	

Unit	Description in details	Weightage (%)
I.	<p>Various Reaction Mechanisms:</p> <p>Substitution Reaction: Nucleophilic substitution reactions in aliphatic and aromatic system, SN1, SN2 reactions, Hydride transfer reaction, Participation of neighboring group in nucleophilic substitution reaction and rearrangements. .</p> <p>Elimination Reaction: Beta Elimination reactions, E1, E2 and E1cb mechanisms, Hoffman and saytzeff's rule for elimination, stereochemistry of E2 reaction, Elimination from alicyclic compounds.</p> <p>Addition Reaction: Electrophilic and Nucleophilic additions, Stereochemistry involved, Markonikovs rule.</p> <p>Free Radical Reaction: Formation, Detection, Reactions, Homolysis and free radical displacements, addition and rearrangements of free radicals.</p>	25
II.	<p>Heterocyclic chemistry:</p> <p>Nomenclature, synthesis, physical, chemical and spectroscopic properties of pyrrole, furan, thiophen, pyridine, pyridazine, pyrimidine, pyrazine, quinoline, isoquinoline, indole, oxazole, imidazole and benzimidazole.</p>	25
III.	<p>Modern synthetic methods:</p> <p>Green Synthesis: Introduction; Green reagents; green catalysts; ionic solvents; phase transfer catalysis in green synthesis; application of phase transfer catalysts in green synthesis of heterocyclic compounds: Williamson's synthesis, Wittig reaction.</p> <p>Microwave assisted synthesis: Introduction; microwave reactions in water (Hofmann elimination, hydrolysis and oxidation); microwave reactions in organic solvents; solid state reactions; advantages of microwave technique.</p>	25
IV.	<p>Oxidation and reduction reactions:</p> <p>Oxidation reaction involving use of potassium permanganate, potassium dichromate, chromic acid, selenium dioxide, periodic acid, N-bromo succinimide and oppenaure oxidation. Reduction reactions using metal and acid, metal amine reduction, catalytic reduction, hydrogenation of double bond, triple bond and aromatic rings, birch reduction, Meerwein-Pondroff-Verley reduction.</p>	25

Basic Text & Reference Books:

1. Morrison RT and Boyd RN, *Organic Chemistry*, 11th edition, Prentice-Hall of India Pvt. Ltd, New Delhi,
2. Thomas L. Gilchrist, 2008, *Heterocyclic Chemistry*, 3rd edition, Pearson Education.
3. Raj K. Bansal, 2010, *Heterocyclic Chemistry*, 5th edition, New Age International Publishers.
4. J. March, 2005, *Advanced Organic Chemistry – Reaction, Mechanism and Structure*, 4th edition, A Wiley-Interscience Publication, John Wiley & Sons, New York.
5. Peter Sykes, 1985, *A Guidebook to Mechanism in Organic Chemistry*, 6th edition, Longmann Scientific and Technical, Co published with John Wiley & Sons, Inc, New York.
6. James Clark & Duncan Macquarrie, 2002, *Handbook of Green Chemistry and Technology*, Blackwell Science Ltd
7. William M. Nelson, *Green solvents for Chemistry: Perspectives and Practice*, Oxford University Press
8. VK Ahluwalia & M Kidwai, 2004, *New Trends in Green Chemistry*, Kluwer Academic Publishers.
9. VK Ahluwalia & Renu Agarwal, 2006, *Organic Synthesis-Special Techniques*, Alpha Science International.
10. M. Lancaster, 2002, *Green Chemistry: An Introductory Text*, Royal Society of Chemistry.

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M. Sc. PHARMACEUTICAL CHEMISTRY
Semester : I
Syllabus Effective From : June 2017

Paper Code : PS01CPCH23	Total Credits : 4
Title of paper : Chemistry of Natural Products I	

Unit	Description in detail	Weightage (%)
I.	General Introduction: Definition, history, scope and development of Pharmacognosy Sources of drugs: Biological, marine, mineral and plant tissue cultures as sources of drugs Classification of drugs: Alphabetical, morphological, taxonomical, chemical and pharmacological classification of drugs.	25
II.	Isolation and properties of active Drug: Occurrence, distribution, organoleptic evaluation, active constituents of drugs: their isolation, classification and properties including tests of drugs: Antineoplastic, Antidiabetics, Diuretics, Antiseptic and disinfectants, Antimalarials, Oxytocics.	25
III.	Quality control of crude drugs: Classification of crude drug, scheme for pharmacognostic studies of crude drug, drug Adulteration, Methods for drug evaluation, organoleptic, Microscopic, chemical evaluation, biological testing of herbal drug, phytochemical investigations.	25
IV.	Pharmacognostic study: Systematic Pharmaceutical Studies of following Carbohydrates and derived products: agar, guar gum acacia, Honey, Isabgol, pectin, Starch, sterculia and Tragacanth. Lipids: Bees wax, Castor oil, Cocoa butter, Cod-liver oil, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Rice, Bran oil, Shark liver oil and Wool fat.	25

Basic Text & Reference Books:

1. S. Natori et al., *Advances in Natural Product Chemistry, extraction and isolation of biologically active compounds*. Wiley, New York.
2. Mukherjee Pulok, *Quality Control of Herbal Drugs*, Business Horizons Limited, New Delhi.

3. J.B. Harborne, Chapman and Hall, *Phytochemical methods*, International Ed., London.
4. *Modern methods of plant analysis* by Peach and Tracey, Vol. II, IV, Springer Verlag.
5. G.E. Trease and W.C. Evans., *Pharmacognosy*, W.B. Saunders Co. Ltd., Harcourt Publishers Ltd. UK.
6. Chaudhari R.D., *Herbal Drug Industry*, Eastern Publication.
7. *Quality Control Methods for medicinal plant material*, WHO Geneva.
8. SS Agrawal and M Paridhavi, *Herbal Drug technology*, Orient Longman
9. *Indian Herbal Pharmacopoeia*, Vol. I- II, SS Handa, RRL Jammu Tawi, and IDMA Mumbai.
10. *The Aurvedic Pharmacopoeia of India*, 1999. Government of India, Ministry of Health and Family Welfare, Department of Indian Systems of Medicine and Homeopathy, New Delhi.
11. Houghton P, Mukherjee PK. *Evaluation of Herbal Medicinal Product*, Pharmaceutical Press, London, 2009.

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Semester : I
Syllabus Effective From : June 2017

Paper Code: PS01CPCH24	Total Credits: 4
Title Of Paper: Practicals-I	

Unit	Description in detail	Weightage (%)
I.	Group – A: Qualitative analysis of Biomolecule, Organic mixtures (Binary mixtures), Inorganic mixtures: <ul style="list-style-type: none"> • Identification of Biomolecule – Carbohydrate, Protein and Lipid. • Qualitative analysis of unknown biomolecule (viz. Glucose, Fructose, Lactose, Maltose, Sucrose, Starch, Protein, Lipid. • Perform colour reaction of proteins. • Perform Precipitation reactions of proteins. • Qualitative analysis of Organic solid Mixture (Binary) 	50
II.	Group – B: Quantitative analysis of Biomolecule and Organic compound compounds: <ul style="list-style-type: none"> • Estimation of acidity and alkalinity in urine. • Estimation of Aniline, Phenol, Methyl salicylate etc. 	50

Basic Text & Reference Books:

1. Vogel's, Longman, *Organic Qualitative analysis*; ISBN-13: 9780582442504; ISBN: 0582442508.
2. Vogel's, Longman; *A Text book of Practical Organic Chemistry*; ISBN-13: 9780582442504; ISBN: 0582442508.
3. Plummer & T. David; *An Introduction to Practical Biochemistry*; Publisher: McGraw-Hill, London; ISBN-13: 9780070941625; ISBN: 0070941629.
4. Vogel's; *Elementary Practical Organic Chemistry*, Part I, II, & III (ELBS); ISBN: 81-239-1033-9.
5. Mann and Saunders, *Practical Organic Chemistry*; Orient Logmann Publisher; OLBN: 0-00209-058-9.
6. Ahluwalia; *Comprehensive Practical Organic Chemistry: Volume – I & II*, Universities Press (India) Pvt. Ltd.; ISBN-13: 9788173712739; ISBN: 8173712735
7. A. H. Bakett and J.B. Stenlake; *Practical Pharmaceutical Chemistry*, Volume I & II; CBS Publisher; ISBN: 81-239-0514-9.

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Syllabus Effective From: June 2017

Paper Code: PS01CPCH25	Total Credits:4
Title Of Paper: Practicals-II	

Unit	Description in detail	Weightage (%)
I.	Group – A: Qualitative analysis of Inorganic mixture (Two positive and Two negative radicals)	50
II.	Group – B: Quantitative analysis of Inorganic compounds: Estimation of Boric acid, Zinc oxide, Borax, Citric acid, Calcium gluconate, Ferrous sulphate, Ammonium chloride Physical: <ul style="list-style-type: none"> • Saponification value of Castor oil • Acid value of Oil and fats • Ester value of Oil and fats. • Measurement of Surface tension and Interfacial tension. • Measurement of Viscosity of liquid using Ostwald’s Viscometer • Study the effect of concentration of Oxalic acid on Adsorption using activated charcoal. 	50

Basic Text & Reference Books:

1. Vogel’s, Longman, *Organic Qualitative analysis*; ISBN-13: 9780582442504; ISBN: 0582442508.
2. Vogel’s, Longman; *A Text book of Practical Organic Chemistry*; ISBN-13: 9780582442504; ISBN: 0582442508.
3. Plummer & T. David; *An Introduction to Practical Biochemistry*; Publisher: McGraw- Hill, London; ISBN-13: 9780070941625; ISBN: 0070941629.
4. Vogel’s; *Elementary Practical Organic Chemistry*, Part I, II, & III (ELBS); ISBN: 81- 239- 1033-9.
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6. Ahluwalia; *Comprehensive Practical Organic Chemistry: Volume – I & II*, Universities Press (India) Pvt. Ltd.; ISBN-13: 9788173712739; ISBN: 8173712735
7. A. H. Bakett and J.B. Stenlake; *Practical Pharmaceutical Chemistry*, Volume I & II; CBS Publisher; ISBN: 81-239-0514-9.

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Semester : I
Syllabus Effective From : June 2017

Paper Code : PS01EPCH21	Total Credits: 4
Title of paper : Biophysical Chemistry	

Unit	Description In detail	Weightage (%)
I	<p>Buffered and isotonic solution pH, pH scale, Buffer capacity: Approximate calculation of buffer capacity, henderson hesselbalch equation and its significance., maximum buffer capacity, neutralization curves and buffer capacity. Buffers in pharmaceutical and biological systems: In vivo biological buffer systems, pharmaceutical buffers, preparation of pharmaceutical buffer solution, influence of buffer Capacity and pH on tissue irritation, stability vs optimum therapeutic response, pH and solubility.</p>	25
II	<p>Physical properties of pharmaceutical liquid: Viscosity: Introduction – Concepts of viscosity, factors influencing viscosity, Newtonian and Non – Newtonian systems, Thixotropy: Measurement of Thixotropy bulges and spurs, negatives thixotropy, thixotropy in formulation. Type & choice of Viscometer, Viscoelasticity Pharmaceutical application , mathematical problems</p> <p>Surface and interfacial phenomena Liquid interfaces: surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions method spreading co –efficient. Adsorption of liquid interfaces: surface active agents, systems of hydrophile – lipophile classification.</p>	25
III	<p>Dispersion and Emulsion: Coarse dispersion (Dispersion systems), Classification, purification and stability of pharmaceutical dispersion.</p> <p>Suspensions: Classification of suspensions, Particle – particle interaction and behavior, Interfacial properties of suspended particles (Brownian movement) factors affecting, formulation of suspension.</p> <p>Emulsion: Emulsion types, pharmaceutical applications, Theories of emulsification. Mono molecuclular adsorption, multimolecular adsorption and film formation, solid particle adsorptions, Physical</p>	25

	stability of emulsions (Preservation of emulsions), Microemulsions.	
IV	Drug Stability and Dissolution: Introduction, Physical and chemical degradation of pharmaceutical product, Factors affecting , chemical stability testing Solubility and Dissolution: Solute – solvents interactions, polar and non polar solvents, Dissolution of drugs – drug absorption, tablets and capsule dissolution, factors affecting dissolution, mathematical treatment of powder dissolution.	25

Reference Books :

- 1 Subramanyam C V S, *Text book of Physical pharmaceuticals*, Vallabh prakashan, New Delhi; ISBN:81-85731-08-X.
- 2 Sinko Patrick J., *Martin's Physical Pharmacy and Pharmaceutical Sciences*, Publisher: Lippincott Williams & Wilkins; ISBN: 0-7817-6426-2.
- 3 Michael J Rosen, Milton J Rosen, *Surfactants and Interfacial Phenomena*, Publisher: Wiley-Interscience; ISBN-13: 9780471836513; ISBN: 0471836516.
- 4 Alfred N Martin, *Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences*; ISBN-13: 9780812101638; ISBN: 0812101634.

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Semester: I
Syllabus Effective From: June 2017

Paper Code: PS01EPCH22	Total Credits:4
Title Of Paper: Polymer Technology	

Unit	Description in detail	Weightage (%)
I.	Introduction: Characteristics of polymers, States of orders in polymers, Macromolecules in solution, molten state, electrometric state, glassy (amorphous) state and crystalline state, Correlation of structure and morphology with properties of polymers.	25
II.	Industrial polymers-Addition & Condensation polymers: Polyolefines and olefin copolymers, Acrylics and Vinyl polymers, Polyesters, Polyamides, Polycarbonates and Cellulosic polymers.	25
III.	Speciality Polymers and its Characterization: Heat and fire resistance polymers, Liquid crystal polymers, Electroactive, Optical information polymers, degradable polymers, Polymers supporting in organic synthesis, Polymer supported catalysts. Characterization: Molecular weight determination, glass transition (T _g) determination, XRD, SEM, TEM.	25
IV.	Trends in polymer application: Polymers in packaging, Automative, Aerospace, Electricals and Electronics, Medical and Biomedical, Sport, Marine, Agriculture, Domestic and Business appliances, Building and construction.	25

Basic Text & Reference Books:

1. Gowarikar, *Polymer Science*, 17th reprint.
2. Bill Mayer, *Polymer Chemistry*, McGraw Hill 3rd edition.
3. K. Gunther, Hanser, *Characterization of Plastics by physical methods*, pub. 1st edition.
4. J. Bridson, *Plastic Materials*, Bh pub, 6th edition.
5. Manaschanda & SK Roy, *Plastics Technology Hand Book*, Marcel Dekker Inc. 3rd edition.
6. D. Brown, *Polymer Synthesis, Theory and Practice*, Springer Pub. 4th edition.
7. RJ Crawford, *Plastic Engg.* BH Pub, 3rd edition.
8. R.W. Dyson, *Speciality Polymers*, Chapman & hall Publications.