

SARDAR PATEL UNIVERSITY

VALLABH VIDYANAGAR



M. Sc.

PHARMACEUTICAL CHEMISTRY

SYLLABUS EFFECTIVE FROM: 2017-18

Semester: II

Paper Code: PS02CPCH21	Total Credits: 4
Title of paper: Organic Chemistry II	

Unit	Description In Detail	Weightage (%)
I.	Stereochemistry: Stereochemical nomenclature & terminology. General concepts on: Chirality, Molecular dissymmetry, Elements of symmetry (plane, centre and axis with relevant examples), optical activity and specific rotation, enantiomers distereomers, Sequence rule - Relative and absolute configuration (D, L and R, S nomenclature), Projection formulae (Fischer, Howarth, Newman and Sawhorse). Stereochemistry of compounds with one stereogenic centre, stereochemistry of compounds with two similar and dissimilar stereogenic centres, properties of stereoisomers. Stereochemistry of alkenes. Stereochemistry of allenes, alkylidene cycloalkane, spirans, biphenyls and fused ring. Racemic modification – properties, methods and resolution.	25
II.	Reaction Mechanism: Carbonium ions, carbanions, their generation, stability and fate. Wagner-Meerwein rearrangement and related reactions, pinacol-pinacolone rearrangement, Benzil-benzilic acid rearrangement, Hofmann rearrangement, Curtius rearrangement, Schmidt reaction, Beckmann rearrangement, Lossen rearrangement, Claisen rearrangement, Cumin-hydroperoxide rearrangement, Fries rearrangement, Wittig reaction.	25
III.	Reagents Used in Synthesis (Mechanism and utility of following Reagents): Oxidizing agents: Potassium permanganate, Peracids, H ₂ O ₂ /–OH, OsO ₄ . Reducing agents: LiAlH ₄ , NaBH ₄ , Lindlar's catalyst. Alkylating agent: 1,3–Dithiane, Grignard reagent Gilman's Reagent.	25

IV.	<p>Synthon Approach and its Application: Synthon Approach: Definition of terms – disconnection, synthon, functional group interconversion (FGI). Basic rules in Disconnection. Application: Use of synthon approach in synthesis of compounds (Trimethoprim, Ibuprofen, Propanolol, Ciprofloxacin, Cimetidine, Diclofenac, Captopryl).</p>	25
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Basic Text & Reference Books:

1. J. March, 2005, *Advanced Organic Chemistry – Reaction, Mechanism and Structure*, 4th edition, A Wiley-Interscience Publication, John Wiley & Sons, New York.
2. E.L. Eliel- *Stereochemistry of Carbon Compounds*, Tata McGraw-Hill Publishing Company Ltd, New Delhi
3. E.L. Eliel and S.H. Wilen, *Stereochemistry of Organic Compounds*, A Wiley-Interscience Publication, John Wiley & Sons, New York.
4. Thomas Laue and Andreas Plagens (Eds), 2005, *Named Organic Reaction*, 2nd Ed, John Wiley & Sons Ltd, England. 35.
5. P.S. Kalsi, 2006, *Stereochemistry, Conformation and Mechanism*, 6th edition, New Age International (P) Limited, Publishers, New Delhi.
6. D. Nasipuri, 2003, *Stereochemistry of Organic Compounds – Principles and Applications*, 2nd edition, New Age International (P) Limited, Publishers, New Delhi.
7. Laszlo Kurti & Barbara Czako, *Strategic application of named reaction in organic synthesis*, Elsevier Academic Press.
8. Peter Sykes, 1985, *A Guidebook to Mechanism in Organic Chemistry*, 6th edition, Longmann Scientific and Technical, Copublished with John Wiley & Sons, Inc, New York.
9. G.R. Stephenson, 1996, *Advanced Asymmetric Synthesis*, 1st edition, Blackie Academic and Professional, London

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

Paper Code: PS02CPCH22	Total Credits:4
Title of paper : Medicinal Chemistry	

Unit	Description in Detail	Weightage (%)
I.	<p>Antibacterial agents and Antibiotics: Introduction, General introduction to bacteria and bacterial cell wall, antibiotics, microbial resistance, classification of antibiotics, structure activity relationship, mode of action, adverse effect of following class of antibiotics: β-lactam antibiotics, Cephalosporins, Aminoglycoside antibiotics, Tetracycline antibiotics, Macrolide antibiotics, Polypeptide antibiotics, Unclassified antibiotics.</p> <p>Synthesis: Methicillin, Oxacillin, Cloxacillin, Dicloxacillin, Ampicillin, Amoxycillin, Carbenicillin, Cephalexin, chloramphenicol, Cycloserine, Trimethoprim, etc.</p>	25
II.	<p>Sulphonamides and Antineoplastic Agents:</p> <p>Sulphonamides: Introduction, Nomenclature, classification, mode of action, adverse effects. Synthesis: Sulphanilamide, Sulphathiazole, Sulphadiazine, Sulphamethoxazole, Nitrofurazone etc.</p> <p>Antineoplastic Agents (Cancer Therapy): Introduction to cancer, Types, Causes & Treatment of cancer, Cell cycle kinetics – cancerous cell, Classification of antineoplastic agent, mode of action, structure activity relationship and adverse effect. Synthesis of Mechloromethamine hydrochloride, Melphalan, 6-mercaptopurine, Methotrexate, Chlorambucil, Cyclophosphamide, Thiotepea.</p>	25
III.	<p>Anti – mycobacterial and Antimalarial agents:</p> <p>Anti – mycobacterial agents: Introduction, classification, Treatment, Mode of action, adverse effect of Anti TB agents & Anti-leprotic agents, MDR TB & XDR TB. Synthesis : Isoniazid, para-amino salicylic acid, pyrazinamide, ethambutol, Ethionamide, Prothionamide, Dapsone etc.</p> <p>Antimalarial agents: Introduction, Life cycle of plasmodium, Antimalarial Agents for Chemotherapy and Prophylaxis: Classification, SAR and mode of action of Anti – malarial drugs. Synthesis of Mefloquine, Chloroquine, Primaquine, Quinacrine, Amodiaquine, pyrimethamine etc.</p>	25
IV.	<p>Antifungal agents, Antiviral agents:</p> <p>Anti Viral : General Introduction, Types of viruses, Classification of antiviral agents, mechanism of action, Antiviral Compounds for DNA Viruses & Selected RNA Virus Infections other than HIV (viz. for Influenza A and B Viruses, Hepatitis C Virus).</p> <p>Anti fungal : Introduction to Fungal Diseases and Pathogens, Antifungal Chemical Classes, Synthesis of Ketoconazole, Nystatin etc.</p>	25

Basic Text & Reference Books:

1. S. Alagarsamy, *Text book of Medicinal Chemistry*, Vol – I/II, Elsevier, Rajkamal Electric Press, Kundli, Haryana, ISBN – 978 – 81- 312 – 2189 – 1.
2. Ashutosh Kar, *Medicinal Chemistry*, New age international publisher, ISBN – 81-224-1970- 4.
3. David A. Williams, Thomas L. Lemke, *Foye's Principles of Medicinal Chemistry*, 5th edition, Lippincott Williams & Wilkins publisher - a Walter kluwer business, ISBN – 13: 978-81-89836-02-3 ISBN – 10: 81-89836-02-1. ISBN: 0-7817-4211-0.
4. John H. Block, John M. Beale, Jr., Wilson and Gisvold's *Textbook of Organic Medicinal and Pharmaceutical Chemistry*, 11th edition, Lippincott Williams & Wilkins publisher - a Walter kluwer business, ISBN – 0-7817-3481-9
5. Dr. S. S. Kadam, Dr. K.R.Mahadik, Dr. K.G.Bothara, *Principles of Medicinal Chemistry, Volume – I & II, 15th edition*, Nirali Prakashan, ISBN: 81-85790-04-3.
6. Harkishan Singh, V. K. Kapoor, *Medicinal and Pharmaceutical chemistry*, Delhi – Vallabh Prakashan, ISBN – 81-85731-00-4, VSBN – 38, 2nd edition, reprint (2008).
7. Donald J. Abraham, *Burger's Medicinal Chemistry And Drug Discovery, Volume I to VI, 6th edition*, A John Wiley and Sons, Inc., Publication, ISBN 0-471-2p7090-3.

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Semester: II
Syllabus Effective From: June 2017

Paper Code: PS02CPCH23	Total Credits : 4
Title of paper : Modern analytical Techniques	

Unit	Description In Detail	Weightage (%)
1	<p>Analytical Separation: Introduction of various separation techniques, Separation by precipitation, distillation, solvent extraction, Electro deposition, Membrane separation, and miscellaneous methods.</p> <p>Solvent Extraction: Principles, Classification, Mechanism of Extraction, Factors favoring solvent extraction, Quantitative treatment of solvent Extraction, Advantages, Applications, Synergistic Extraction, Extraction Reagents.</p>	25
2	<p>Introduction to chromatography and classification of chromatographic methods based on the mechanism of separation</p> <p>Column Chromatography: Adsorption and partition, theory, preparation, procedure and methods of detection</p> <p>Thin Layer Chromatography: Theory, preparation, procedures, detection of compounds</p> <p>Paper Chromatography: Theory, different techniques employed, filter papers used, qualitative and quantitative detection</p> <p>Counter – current extraction, solid phase extraction techniques, gel filtration</p>	25
3	<p>Gas chromatography: Introduction, fundamentals, instrumentation, columns: preparation and operation, detection, dramatization.</p> <p>HPLC: Principles and instrumentation, solvents and columns used, detection and applications</p> <p>HPTLC: Theory and principle, instrumentation, elution techniques and pharmaceutical applications.</p>	25
4	<p>Miscellaneous separation methods:</p> <p>Supercritical Fluid Chromatography: Properties of supercritical Fluids, Principles of Supercritical Fluid Chromatography, Supercritical Fluid & Extraction.</p> <p>Electrophoresis: Principles of Electrophoresis, Experimental assembly, Reverse Osmosis, Electrodialysis, Overview of Electrophoresis, Capillary Electrophoresis, Applications, Packed column Electro chromatography.</p>	25

Basic Text & Reference Books:

1. Holler, Skoog, *Principals of Instrumental Analysis*, 6th Edition, Crouch, India edition Reprint: 2007. ISBN: 81-315-0329-1.
2. Douglas A. Skoog, F. James Holler, and Timothy A. Nieman; *Principles of Instrumental Analysis*, Publisher: Brooks Cole, ISBN: 981-243-869-6.
3. Willard, Merritt, Dean, Settle; *Instrumental Methods of Analysis*, CBS Publisher and Distributors, ISBN: 81-239-0943-8.
4. Skoog, West, Holler & Crouch, *Fundamentals of Analytical Chemistry*, Publisher: Brooks Col, ISBN : 981-243-513-1, (2006).
5. Douglas A. Skoog, Donald M. West, F. James Holler, *Fundamentals of Analytical Chemistry* (Dryden Press Series in Management) ISBN-13: 9780030749223 ISBN: 0030749220.

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Semester: II
Syllabus Effective From: June 2017

Paper Code: PS02CPCH24	Total Credits: 4
Title Of Paper: Practicals-I	

Unit	Description in detail	Weightage (%)
I.	Group – A: Qualitative analysis of Solid Mixture (Ternary)	50
II.	Group – B: Organic Preparation viz: Dibenzalacetone, paranitro-acetanilide, methyl salicylate, 4-acetamido-3-bromo-toluene, paramethoxy-acetanilide, Eosin, Hydantoin.	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. Vogel's, *Elementary Practical Organic Chemistry*, Part I, II, & III (ELBS); ISBN: 81-239-1033-9.
4. Mann and Saunders; *Practical Organic Chemistry*, Orient Logmann Publisher; OLBN: 0-00209- 058-9.
5. V. K. Ahluwalia, *Comprehensive Practical Organic Chemistry: Volume – I & II*, Universities Press (India) Pvt. Ltd; ISBN-13: 9788173712739; ISBN: 8173712735.

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Semester: II
Syllabus Effective From: June 2017

Paper Code: PS02CPCH25	Total Credits:4
Title Of Paper: Practicals-II	

Unit	Description in detail	Weightage (%)
I.	Group – A: To separate & identify the given unknown organic ternary mixture.	50
II.	Group – B: To carry out the synthesis of heterocyclic compounds (3 - 4 steps) (viz. Flavones, Quinolines, Quinazolines, Coumarins, Thiadiazoles, Oxadiazoles, Triazoles etc using basic unit processes, unit operations and TLC.	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. Vogel's, *Elementary Practical Organic Chemistry*, Part I, II, & III (ELBS); ISBN: 81-239-1033-9.
4. Mann and Saunders; *Practical Organic Chemistry*, Orient Logmann Publisher; OLBN: 0-00209- 058-9.
5. V. K. Ahluwalia, *Comprehensive Practical Organic Chemistry: Volume – I & II*, Universities Press (India) Pvt. Ltd; ISBN-13: 9788173712739; ISBN: 8173712735.

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

Paper Code:PS02EPCH21	Total Credits:4
Title of paper: Chemistry Of Natural Product II	

Unit	Description in detail	Weightage (%)
I.	Alkaloids: Introduction, occurrence, functions of alkaloid, Nomenclature, classification, isolation, and general methods of structure elucidation. From opium: morphine-structure elucidation, development of morphine analogues and morphine antagonists. From Rauwolfia: Reserpine-structure elucidation, structural modifications and uses. From vinca rosea: vincristine and vinblastine - structural modification, semi synthetic derivatives and uses.	25
II.	Steroids: Introduction, Occurrence, function of steroids, nomenclature, classification, Isolation and stereochemistry of steroids. Source and structure elucidation of cholesterol and diosgenin. Structures, structure modifications and therapeutic uses of steroidal anti-inflammatory agents and antifertility agents.	25
III.	Polypeptides and proteins: Introduction, general principle of and methods for polypeptide synthesis, naming, structure and general methods of separation, general methods of degradation and end group analysis. Proteins : Characteristics of Protein Classification and composition Primary,secondary, tertiary and quaternary structure of proteins; chemistry of insulin.	25
IV.	Compounds of medicinal Interest: Structure, structural modifications, mechanism of action and therapeutic uses of : a) taxanes, b) camptothecin, c) artemisinin, e) ginkgolides and, f) gymnemic acids.	25

Basic Text & Reference Books:

1. Agrawal O P., *Organic Chemistry-Natural Products. 30th ed. Vol. 1-2.* Meerut: Goel Publishing House; 2006.
2. Finar IL. *Organic Chemistry-stereochemistry and the chemistry of natural products.* 5th ed. Vol Delhi: Dorling Kindersley (India) Pvt. Ltd., 2006.
3. Morrison RT, Boyd RN. *Organic Chemistry.* 6th ed. Delhi: Pearson education Pvt. Ltd., 2003.
4. Pelletier SW. *Alkaloids-chemical & biological perspectives.* Vol 1-15. London: Pergamon; 2001.
5. Evans WC. Trease and evans, *Pharmacognosy.* 15thed. Edinburgh: Saunders. 2004.
6. Bhat SV, Nagasampagi BA, Sivakumar M., *Chemistry of natural products.* New Delhi: Narosa Publishing House; 2005.

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M. Sc. PHARMACEUTICAL CHEMISTRY

Semester: II

Syllabus Effective From: June 2017

Paper Code: PS02EPCH22	
Title Of Paper: Inorganic Drug Chemistry	Total Credits:4

Unit	Description in detail	Weightage (%)
I.	<p>Quality Control Of Inorganic Drugs & Pharmaceuticals Impurities in Pharmaceutical substances and their limit test: Impure chemical compound, Pure chemical compound, Impurities commonly found in Medicinal preparations, source, effect and permissible impurities in pharmaceutical chemicals, methods used to purify the inorganic substances, tests of purity, limit tests for chlorides, sulphate, iron and heavy metal, Heavy metals in volatile oils, lead, special procedures for preparing primary and auxiliary solutions for carrying out limiting test for lead, limit test for lead as per B.P., limit test for Arsenic, Volatile or Non – volatile products.</p>	25
II.	<p>Antioxidants, Gastrointestinal Agents Antioxidants; Introduction, criteria for a substances to act as an antioxidant, mechanism of action, hypophosphorous acid, sulphur dioxide, sodium metabisulphite, sodium sulphite, sodium bisulphate, nitrogen, carbon dioxide, sodium nitrite, sodium thiosulphate. Gastrointestinal agents: Introduction, acidifiers, antacids, aluminium, calcium, magnesium and sodium compounds as antacids, preparations containing combinations of antacids, protectives and adsorbents, bismuth compounds, laxatives, cathartics and purgatives.</p>	25
III.	<p>Topical agents and Dental Products: Topical agents: Introduction, categories of Topical agent, protective and adsorbents, antimicrobial agents, compounds acting by protein precipitation, astringents. Dental Products: Introduction, anticaries agents, cleaning agent or Dentrifrices, Polishing agents, desenting agents, oral antiseptics and astringents, mouth washes, cements and fillers.</p>	25
IV.	<p>Miscellaneous Agents Inhalants: Introduction, role of oxygen, carbon dioxide, ammonia, nitrous oxide, helium, ammonium carbonate and dilute solution of ammonia. Major Intra and Extracellular Electrolyte: Role of major physiological cations and anions, electrolytes used in replacement therapy, electrolyte combination theory, physiological acid – base balance, acid – base imbalances, electrolytes used in acid – base therapy, dialysis fluids.</p>	25

Basic Text & Reference Books:

1. *Chatwal*, Inorganic Pharmaceutical Chemistry
2. *Block, Roche and Sonie and Wilson*, *Inorganic Medicinal and Pharmaceutical Chemistry*
3. *Gundu Rao*, Inorganic Pharmaceutical chemistry
4. Indian Pharmacopeia