

Time-table of post-graduate lectures for the M.Sc. (PART-II) Semester III in Organic Chemistry at Thane division for the year 2018-19

Dr. V. B. Patil (Coordinator Thane Zone)

Sr. No.	Name of Teacher	Days & Date	Topics	Lect.
1	Dr. Tanaji Bansode 2.00pm-5.00pm CHM college	Mondays Aug. 27 Sept. 3,10,24 Oct.1,8,15,22,29 Nov.26	<p><u>Course Code: PSCHO301</u> <u>Paper - I (Theoretical organic chemistry-I) Unit 2 Pericyclic reactions [15L]</u> 2.1 Cycloaddition reactions: Supra and antra facial additions, 4n and 4n+2 systems, 2+2 additions of ketenes. Diels-Alder reactions, 1, 3-Dipolar cycloaddition and cheletropic reactions, ene reaction, retro-Diels-Alder reaction, regioselectivity, periselectivity, torquoselectivity, site selectivity and effect of substituents in Diels-Alder reactions. Other Cycloaddition Reactions- [4+6] Cycloadditions, Ketene Cycloaddition, Allene Cycloadditions, Carbene Cycloaddition, Epoxidation and Related Cycloadditions. Other Pericyclic reactions: Sigmatropic Rearrangements, Electrocyclic Reactions, Alder 'Ene' Reactions. [7L] 2.2 Electrocyclic reactions: Conrotatory and disrotatory motions, 4np and (4n+2)p electron and allyl systems. [3L] 2.3 Sigmatropic rearrangements: H-shifts and C-shifts, supra and antarafacial migrations, retention and inversion of configurations. Cope (including oxy-Cope and aza-Cope) and Claisen rearrangements. Formation of Vitamin D from 7-dehydrocholesterol, synthesis of citral using pericyclic reaction, conversion of Endiandric acid E to Endiandric acid A. [5L] <u>Course Code: PSCHO302 Paper-II Synthetic Organic Chemistry-I</u> <u>Unit 2: Radicals in organic synthesis [15L]</u> 2.1 Introduction: Generation, stability, reactivity and structural and stereochemical properties of free radicals, Persistent and charged radicals, Electrophilic and nucleophilic radicals. [3L] 2.2 Radical Initiators: azobisisobutyronitrile (AIBN) & dibenzoyl peroxide. [1L] 2.3 Characteristic reactions - Free radical substitution, addition to</p>	30L

			<p>multiple bonds. Radical chain reactions, Radical halogenation of hydrocarbons (Regioselectivity), radical cyclizations, autoxidations: synthesis of cumene hydroperoxide from cumene. [4L]</p> <p>2.4 Radicals in synthesis: Inter and intra molecular C-C bond formation via mercuric hydride, tin hydride, thiol donors. Cleavage of C-X, C-Sn, C-Co, C-S, O-O bonds. Oxidative coupling, C-C bond formation in aromatics SRNAr reactions. [4L]</p> <p>2.5 Hunsdiecker reaction, Pinacol coupling, McMurry coupling, Sandmeyer reaction, Acyloin condensation. [3L]</p>	
2	<p>Dr. D.N. Shinde</p> <p>5.00pm-6.00pm</p> <p>4.00pm-5.00pm</p> <p>CHM College</p>	<p>Mondays</p> <p>Aug. 27 Sept. 3, 10, 24 Oct. 1, 8, 15, 22, 29 Nov. 26 Tuesdays Aug. 28 Sept. 4, 11, 18, 25</p>	<p>Course Code: PSCHO301 Paper - I (Theoretical organic chemistry- I) Unit 4 Photochemistry [15L]</p> <p>4.1 Principles of photochemistry: quantum yield, electronic states and transitions, selection rules, modes of dissipation of energy (Jablonski diagram), electronic energy transfer: photosensitization and quenching process. [3L]</p> <p>4.2 Photochemistry of carbonyl compounds: $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transitions, Norrish-I and Norrish-II cleavages, Paterno-Buchi reaction. Photoreduction, calculation of quantum yield, photochemistry of enones, photochemical rearrangements of α, β-unsaturated ketones and cyclohexadienones. Photo Fries rearrangement, Barton reaction. [8L]</p> <p>4.3 Photochemistry of olefins: cis-trans isomerizations, dimerizations, hydrogen abstraction, addition and Diels-Alder methane rearrangement including aza-Diels-Alder methane. Photochemical Cross-Coupling of Alkenes, Photodimerisation of alkenes. [2L]</p> <p>4.4 Photochemistry of arenes: 1, 2-, 1, 3- and 1, 4- additions. Photocycloadditions of aromatic rings. [1L]</p> <p>4.5 Singlet oxygen and photo-oxygenation reactions. Photochemically induced Radical Reactions. Chemiluminescence. [1L]</p>	15L
3	<p>Dr. Nagesh Sutar</p> <p>1pm-4pm</p>	<p>Tuesdays</p> <p>Aug. 28 Sept. 4, 11, 18, 25 Oct. 9, 16, 23, 30</p>	<p>Course Code: PSCHO301 Paper - I (Theoretical organic chemistry- I) Unit 3: Stereochemistry-I [15L]</p> <p>3.1 Classification of point groups based on symmetry elements with examples (nonmathematical treatment) [2L]</p> <p>3.2 Conformational analysis of medium rings: Eight to ten membered</p>	30L

	C.H.M. College	Nov.27	<p>rings and their unusual properties, I-strain, transannular reactions.[3L]</p> <p>3.3 Stereochemistry of fused ring and bridged ring compounds: decalins, hydrindanes, perhydroanthracenes, steroids, and Bredt's rule.[5L]</p> <p>3.4 Anancomeric systems, Effect of conformation on reactivity of cyclohexane derivatives in the following reactions (including mechanism): electrophilic addition, elimination, molecular rearrangements, reduction of cyclohexanones (with LiAlH_4, selectride and MPV reduction) and oxidation of cyclohexanols.[5L]</p> <p>Course Code: PSCHO303 Natural products and Spectroscopy</p> <p>2.1 Multi-step synthesis of natural products: Synthesis of the following natural products with special reference to reagents used, stereochemistry and functional group transformations:[8L]</p> <p>a) Woodward synthesis of Reserpine from benzoquinone</p> <p>b) Corey synthesis of Longifoline from resorcinol</p> <p>c) Gilbert-Stork synthesis of Griseofulvin from phloroglucinol</p> <p>d) Corey's Synthesis of Caryophyllene from 2-Cyclohexenone and Isobutylene</p> <p>e) Synthesis of Juvabione from Limonene</p> <p>f) Synthesis of Taxol.</p> <p>2.2 Prostaglandins: Classification, general structure and biological importance. Structure elucidation of PGE1.[2L]</p> <p>2.3 Lipids: Classification, role of lipids, Fatty acids and glycerol derived from oils and fats.[2L]</p> <p>2.4 Insect growth regulators: General idea, structures of JH2 and JH3.[1L]</p> <p>2.5 Plant growth regulators: Structural features and applications of arylacetic acids, gibberellic acids and triacontanol. Synthesis of triacontanol (synthesis of stearyl magnesium bromide and 12-bromo-1-tetrahydropyranyloxydodecane expected).[2L]</p>	
4	Dr.Sandeep Kotwal 2pm-5pm	<p>Wednesday</p> <p>Aug. 29 Sept. 5,12,19,26 Oct.10,17,24,31 Nov.28</p>	<p>Course Code: PSCHO302 Synthetic Organic Chemistry-I</p> <p>Unit 1: Name reactions with mechanism & application [15L]</p> <p>1.1 Mukaiyama esterification, Mitsunobu reaction, Darzen's Glycidic Ester synthesis, Ritter reaction, Yamaguchi esterification, Peterson olefination.[5L]</p> <p>1.2 Domino reactions: Characteristics; Nazarov cyclization[3L]</p> <p>1.3 Multicomponent reactions: Strecker Synthesis, Ugi 4CC, Biginelli</p>	30L

			<p>synthesis, Hantzsch synthesis, Pictet-Spengler synthesis[5L] 1.4 Click Reactions: Characteristics; Huisgen 1,3-Dipolar Cycloaddition[2L] Unit 3: Enamines, Ylides and α-C-H functionalization[15]— <u>Dr.S.B.Kotwal</u> 3.1 Enamines: Generation & application in organic synthesis with mechanistic pathways, Stork enamine reaction. Reactivity, comparison between enamines and enolates. Synthetic reactions of enamines including asymmetric reactions of chiral enamines derived from chiral secondary amines.[4L] 3.2 Phosphorus, Sulfur and Nitrogen Ylides: Preparation and their synthetic applications along with their stereochemical aspects. Wittig reaction, Horner-Wadsworth-Emmons Reaction, Barton-Kellogg olefination.[6L] 3.3 α-C-H functionalization: By nitro, sulfoxide, sulfone and phosphonate groups: generation of carbanions by strong bases (LDA/n-butyl lithium) and applications in C-C bond formation. Bamford-Stevens reaction, Julia olefination and its modification, Seyferth-Gilbert homologation, Steven's rearrangement.[5L]</p>	
5	<p>Dr. Sandeep Kotwal</p> <p>4pm-5pm</p> <p>5pm-6pm</p> <p>CHM College</p>	<p>Tuesdays</p> <p>Oct.9,16,23,30 Nov.27</p> <p>Wednesday</p> <p>Aug. 29 Sept. 5,12,19,26 Oct.10,17,24,31 Nov.28</p>	<p>Course Code: PSCHO302 Synthetic Organic Chemistry-I Unit 4: Metals / Non-metals in organic synthesis[15]—<u>Dr.S.B.Kotwal</u> 4.1 Mercury in organic synthesis: Mechanism and regiochemistry of oxymercuration and demercuration of alkenes, mercuration of aromatics, transformation of aryl mercurials to aryl halides. Organomercurials as carbene transfer reagents.[3L] 4.2 Organoboron compounds: Mechanism and regiochemistry of hydroboration of alkenes and alkynes, asymmetric hydroboration using chiral boron reagents, 9-BBN hydroboration, oxazaborolidine (CBS catalyst) and functional group reduction by diborane.[3L] 4.3 Organosilicons: Salient features of silicon governing the reactivity of organosilicons, preparation and important bond-forming reactions of alkyl silanes, alkenyl silanes, aryl silanes and allyl silanes. β-silyl cations as intermediates. Iodotrimethylsilane in organic synthesis[3L]</p>	15L

			<p>4.4 Silyl enol ethers: Application: As nucleophiles (Michael reaction, Mukaiyama aldol reaction), in ring contraction reactions.[2L]</p> <p>4.5 Organotin compounds: Preparation of alkenyl and allyl tin compounds; application in C-C bond formation, in replacement of halogen by H at the same C atom.[2L]</p> <p>4.6 Selenium in organic synthesis: Preparation of selenols/selenoxide, selenoxide elimination to create unsaturation, selenoxide and seleno acetals as α-C-H activating groups[2L]</p>	
6	<p>Dr. D.N. Shinde</p> <p>2pm-5pm</p> <p>CHM College</p>	<p>Thursdays</p> <p>Aug. 30 Sept. 6,27, Oct.4,11</p>	<p>Course Code: PSCHO303 Natural products and Spectroscopy Unit 1:Natural products-I[15L]</p> <p>1.1 Carbohydrates: Introduction to naturally occurring sugars: Deoxysugars, aminosugars, branched sugars. Structure elucidation of lactose and D-glucosamine (synthesis not expected). Structural features and applications of inositol, starch, cellulose, chitin and heparin.[5L]</p> <p>1.2 Natural pigments: General structural features, occurrence, biological importance and applications of: carotenoids, anthocyanins, quinones, flavones, pterins and porphyrins (chlorophyll). Structure elucidation of β-carotene and Cyanin (with synthesis). Synthesis of ubiquinone from 3, 4, 5-trimethoxyacetophenone.[5L]</p> <p>1.3 Insect pheromones: General structural features and importance. Types of pheromones (aggregation, alarm, releaser, primer, territorial, trail, sex pheromones etc.), advantage of pheromones over conventional pesticides. Synthesis of bombykol from acetylene, disparlure from 6-methylhept-1-ene, grandisol from 2-methyl-1, 3-butadiene.[3L]</p> <p>1.4 Alkaloids: Occurrence and physiological importance of morphine and atropine. Structure elucidation, spectral data and synthesis of coniine.[2L]</p>	15L
7	<p>Dr. D.N.Shinde</p> <p>2pm-5pm</p>	<p>Thursdays</p> <p>Oct.25, Nov.1,29</p>	<p>Course Code: PSCHOEC-I 304 Medicinal , Biogenesis and green chemistry Unit 4:Green chemistry[15L]-----Dr. D.N.Shinde</p> <p>4.1 Introduction, basic principles of green chemistry. Designing a green</p>	15L

	CHM College.	Dec.6,13	<p>synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts.[1L]</p> <p>4.2 Use of the following in green synthesis with suitable examples:[9L]</p> <p>a) Green reagents: dimethylcarbonate, polymer supported reagents.</p> <p>b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phasetransfer catalysts [Aliquat 336, benzyltrimethyl ammonium chloride (TMBA), Tetra-n-butyl ammonium chloride, crown ethers], biocatalysts.</p> <p>c) Green solvents: water, ionic liquids, deep eutectic solvents, supercriticalcarbon dioxide.</p> <p>d) Solid state reactions: solid phase synthesis, solid supported synthesis</p> <p>e) Microwave assisted synthesis: reactions in water, reactions in organic solvents, solvent free reactions.</p> <p>f) Ultrasound assisted reactions.</p> <p>4.3 Comparison of traditional processes versus green processes in the syntheses of ibuprofen, adipic acid, 4-aminodiphenylamine, p-bromotoluene and benzimidazole.[3L]</p> <p>4.4 Green Cataysts : Nanocatalyst, Types of nanoctalysts, Advantages and Disadvantages of Nanocatalysts, Idea of Magnetically separable, nanocatalysts.[2L]</p>	
8	<p><u>Dr.Manisha Khemani</u></p> <p>5pm-6pm</p> <p>CHM College</p> <p>2pm-6pm</p>	<p>Thursdays</p> <p>Thursdays</p> <p>Aug. 30 Sept. 6,27, Oct.4,11,25 Nov.1,29 Dec.6,13</p> <p>Fridays Aug.31 Sept.7.21.28 Oct.5</p>	<p><u>Course Code: PSCHO301 Paper - I (Theoretical organic chemistry-I) Unit 1Organic reaction mechanisms [15L]</u></p> <p>1.1 Organic reactive intermediates, methods of generation, structure, stability and important reactions involving carbocations, nitrenes, carbenes, arynes and ketenes.[5L]</p> <p>1.2 Neighbouring group participation: Mechanism and effects of anchimeric assistance, NGP by unshared/ lone pair electrons, p-electrons, aromatic rings, s-bonds with special reference to norbornyl and icyclo[2.2.2]octylation systems (formation of non-classical carbocation)[3L]</p> <p>1.3 Role of FMOs in organic reactivity: Reactions involving hard and soft electrophiles and nucleophiles, ambident nucleophiles, ambident electrophiles, the α effect.[2L]</p> <p>1.4 Pericyclic reactions: Classification of pericyclic reactions; thermal and photochemical reactions. Three approaches: Evidence for the</p>	30L

			<p>concertedness of bond making and breaking Symmetry-Allowed and Symmetry-Forbidden Reactions – . The Woodward-Hoffmann Rules-Class by Class . The generalised Woodward-Hoffmann Rule Explanations for Woodward-Hoffmann Rules . The Aromatic Transition structures [Huckel and Mobius]. Frontier Orbitals . Correlation Diagrams, FMO and PMO approach Molecular orbital symmetry, Frontier orbital of ethylene, 1,3 butadiene, 1,3,5 hexatriene and allyl system.[5L] Course Code: PSCHOEC-I 304 Medicinal , Biogenesis and green chemistry Unit 3: Biogenesis and biosynthesis of natural products[15L] 3.1 Primary and secondary metabolites and the building blocks, general pathway of amino acid biosynthesis.[3L] 3.2 Acetate pathway: Biosynthesis of malonylCoA, saturated fatty acids, prostaglandins from arachidonic acid, aromatic polyketides.[4L] 3.3 Shikimic Acid pathway: Biosynthesis of shikimic acid, aromatic amino acids, cinnamic acid and its derivatives, lignin and lignans, benzoic acid and its derivatives, flavonoids and isoflavonoids.[4L] 3.4 Mevalonate pathway: Biosynthesis of mevalonic acid, monoterpenes – geranyl cation and its derivatives, sesquiterpenes – farnesyl cation and its derivatives and diterpenes.[4L]</p>	
9	<p>Dr.D.R. Ambavadekar</p> <p>2pm-6pm.</p> <p>2pm-4pm</p>	<p>Fridays</p> <p>Oct-12,19,26 Nov.2,30 Dec 7,14</p> <p>Saturday</p> <p>Sept.1</p>	<p>Course Code: PSCHO303 Natural products and Spectroscopy Unit 3:Advanced spectroscopic techniques-I[15L] 3.1 Proton NMR spectroscopy: Recapitulation, chemical and magnetic equivalence of protons, First order, second order, Spin system notations (A2, AB, AX, AB2, AX2, AMX and A2B2-A2X2 spin systems with suitable examples). Long range coupling (Allylic coupling, 'W' coupling and Coupling in aromatic and heteroaromatic systems), Temperature effects, Simplification of complex spectra, nuclear magnetic double resonance, chemical shift reagents.[7L]</p>	301

	BNB College		<p>3.2 ^{13}C -NMR spectroscopy: Recapitulation, equivalent and non-equivalent carbons (examples of aliphatic and aromatic compounds), ^{13}C- chemical shifts, calculation of ^{13}C- chemical shifts of aromatic carbons, heteronuclearcoupling of carbon to ^{19}F and ^{31}P. [4L]</p> <p>3.3 Spectral problems based on UV, IR, ^1HNMR and ^{13}CNMR and Mass spectroscopy. [4L]</p> <p>Course Code: PSCHOEC-I 304 Medicinal , Biogenesis and green chemistry</p> <p>Unit2: Drug design, development and synthesis[15L]</p> <p>2.1 Introduction to quantitative structure activity relationship studies. QSARparameters: - steric effects: The Taft and other equations; Methods used tocorrelate regression parameters with biological activity: Hansch analysis- Alinear multiple regression analysis. [5L]</p> <p>2.2 Introduction to modern methods of drug design and synthesis-computer-aided molecular graphics based drug design, drug design via enzyme inhibition (reversible and irreversible), bioinformatics and drug design. [3L]</p> <p>2.3 Concept of prodrugs and soft drugs. (a) Prodrugs: Prodrug design, types of prodrugs, functional groups in prodrugs, advantages of prodrug use. (b) Soft drugs: concept and properties. [3L]</p> <p>2.4 Synthesis and application of the following drugs: Fluoxetine, cetirizine, esomeprazole, fluconazole, zidovudine, methotrexate, diclofenac, labetalol, fenofibrate. [4L]</p>	
10	<p>Dr. Anita Goswami</p> <p>4pm-6pm</p> <p>2pm-6pm</p> <p>BNB College</p>	<p>Saturday</p> <p>Sept. 1</p> <p>Sept. 8, 22, 29</p> <p>Oct. 6, 13, 20, 27</p>	<p>Course Code: PSCHO303 Natural products and Spectroscopy</p> <p>Unit 4: Advanced spectroscopic techniques-II[15L]</p> <p>4.1 Advanced NMR techniques: DEPT experiment, determining number of attached hydrogens Methyl/methylene/methine and quaternary carbons), two dimensional spectroscopic techniques, COSY and HETCOR spectra, NOE and NOESY techniques. [10L]</p> <p>4.2 Spectral problems based on UV, IR, ^1HNMR, ^{13}CNMR (Including 2D technique) and Mass spectroscopy [5L]</p> <p>Course Code: PSCHOEC-I 304 Medicinal , Biogenesis and green chemistry</p> <p>Unit 1: Drug discovery, design and development[15L]</p>	30L

			<p>1.1 Introduction, important terms used in medicinal chemistry: receptor, therapeutic index, bioavailability, drug assay and drug potency. General idea of factors affecting bioactivity: Resonance, inductive effect, bioisosterism, spatial considerations. Basic pharmacokinetics: drug absorption, distribution, metabolism (biotransformation) and elimination.</p> <p>Physical and chemical parameters like solubility, lipophilicity, ionization, pH, redox potential, H-bonding, partition coefficient and isomerism in drug distribution and drug-receptor binding.[7]</p> <p>1.2 Procedures in drug design: Drug discovery without a lead: Penicillin, Librium. Lead discovery: random screening, non-random (or targeted) screening. Lead modification: Identification of the pharmacophore, Functional group modification. Structure-activity relationship, Structure modification to increase potency and therapeutic index: Homologation, chain branching, ring-chain transformation, bioisosterism, combinatorial synthesis (basic idea).[8L]</p>	

M. Sc. Part II (SEM. III) ORGANIC CHEMISTRY (2018-2019)

NOTE : Attention of post-graduate students M.Sc. Part II (Sem. III) is invited to the following :-

1. That they will be required to attend in each of the terms, not less than 75% of the total number of lectures delivered & also not less than 75% of the lectures delivered in each paper;
2. In addition to attendance at lectures, they will be required to carry out regular work assigned to them in the form of essays, problems, tutorials, practical etc. as prescribed and shall be required to maintain a record thereof in a properly bound journals. The work carried out by the student shall be reviewed by the respective teachers at the end of two terms. In case, in the opinion of the Head of University Department or the Principals of the recognized Post-graduate Institutions concerned, the candidate has not satisfactorily carried out the assigned work as mentioned above, they may not grant term to the student, even though he/she might have kept the minimum attendance at the lectures.

Mumbai – 400 032.
1st September, 2018.

Sd/-
Assistant Registrar
UG/PG Section

P.S. Teacher participating in the scheme of Post-graduate teaching and Instruction for course in the subject of Chemistry are hereby requested to submit the attendance rolls in respect of the lectures delivered by them during the academic year 2018-2019 within 15 days after completion of their lectures in the respective terms are over to the Superintendent, Post-graduate studies Section, Room No. 130, University of Mumbai, Fort, Mumbai-32.

N.B. Teacher participating in the scheme of post-graduate teaching and Instruction at the M.Sc. degree course in Chemistry are hereby informed that no change will be permitted in the venue and timings of the lectures.

No. PG/ICD/2018-19/ 725 of 2018.

1st September, 2018.

Copy forwarded with compliments to the teachers of the University included in the scheme of post-graduate teaching and instruction at the M.Sc. degree in Chemistry for information and necessary action.

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1st September, 2018.

P. S. Dhurmal
Assistant Registrar
UG/PG Section