

UNIVERSITY OF MUMBAI

Time-Table of Post-Graduate Lectures for MSc. (PART-II) Semester-III in Organic Chemistry for the year 2017 -18 (Thane Zone)

Co-Ordinator : Dr. A.K. Upadhyay 9833162761

Sr. No.	Name of Teacher	Day	Topics	Lec
01	Dr. A. K. Upadhyay C.H.M. College 2.00p.m-4.00p.m 4.00p.m-6.00p.m 4.00p.m-5.00p.m	Mondays June:5,12,19 July:3,10,17,24,31 Aug: 7,14,21 Sep:4,11,18,25 Oct: 9,16 Fridays Sep:15 Sep:22	Paper-I Theoretical Organic Chemistry Unit-1: Organic reaction mechanisms 1.3 Role of FMOs in organic reactivity: Reactions involving hard and soft electrophiles and nucleophiles, ambident nucleophiles & effect. [2L] 1.4 Pericyclic reactions: Classification of pericyclic reactions, thermal and photochemical reactions. Three approaches: Conservation of orbital symmetry- Correlation diagram, Frontier molecular orbital approach [FMO] and aromatic transition state approach [Huckel & Mobius] [5L] Paper-III Natural Products & spectroscopy-I Unit-1: Heterocyclic compounds-I [15L] 1.1 Heterocyclic compounds: Introduction, classification, common, systematic (Hantzsch-Widman) and replacement nomenclature of monocyclic (3-6 membered) and bicyclic (5-6 membered) fused heterocycles (upto three heteroatoms) [5L] 1.2 Small ring heterocycles (3-4 membered): Introduction, nucleophilic ring opening reactions of oxiranes, aziridines, oxetanes & azetidines [3L] 1.3 Reactivity and important methods of synthesis & general reactions of the following heterocycles: pyrazoles, imidazoles, oxazoles, isoxazoles, thiozoles, benzimidazoles, benzoxazoles Benzothiazoles [7L]	37L
02	Prof Sarika C. Talreja C.H.M. College 4.00p.m-6.00p.m	Mondays June:5,12,19 July:3,10,17,24,31 Aug: 7,14,21 Sep:4,11,18,25	Paper-II Unit 2: Protection-deprotection, umpolung & electro-organic chemistry 2.1 Protection and deprotection of the following functional groups: hydroxyl, carbonyl, amino and carboxyl with applications. [5L] 2.2 Concept of umpolung, generation of acyl anion equivalent using 1,3 dithianes, methyl thiomethyl sulfoxides, cyanide ions, cyanohydrins ethers, nitro compounds and vinyldated ethers. [5L] 2.3 Electro-organic chemistry: Introduction, electrode potential, cell parameters, electrolyte, working electrode, choice of solvents, supporting electrolytes. Cathode reductions of alkyl halides, aldehydes, ketones, nitro compounds, olefins, arenes, electro-dimerizations. Anodic oxidation: Kolbe type reactions, oxidation of alkylbenzenes. [5L] Paper-III Unit-2: Natural Products-I [15L] 2.1 Carbohydrates: Introduction to naturally occurring sugars: Deoxysugars, aminosugars, branched sugars. Structure elucidation of lactose, D-glucosamine and mesoinositol (synthesis not expected). Structural features and applications of inositol, starch, cellulose, chitin and heparin. 2.2 Natural pigments: General structural features, occurrence, biological importance and applications of carotenoids, anthocyanins, quinines, flavones, pterins and porphyrins (chlorophyll), Structure elucidation of β - carotene. Synthesis of ubiquinone from 3,4,5-trimethoxyacetophenone. [5L] 2.3 Insect pheromones: General structural features and importance. Synthesis of bombykol from acetylene, disparlure from 6-methylhept-1-ene, grandisol from 2-methyl-1,3-butadiene. [3L] 2.4 Alkaloids: Occurrence and physiological importance of morphine, conine and papaverine. Structure elucidation of papaverine. [2L]	30L

	<p>Dr. Nagesh Sutar C.H.M.College 2.00p.m-3.00p.m</p>	<p>Tuesdays June:6,13,20,27 July:4,11,18,25 Aug: 1,8,22 Sep:5,12,19,26</p>	<p>Paper-III Unit-1 Natural Products 1.1 Multi- step synthesis of natural products: Synthesis of the following natural products with special reference to reagents used, stereochemistry and functional group transformations: a) Woodward synthesis of Reserpine from benzoquinone. b) Corey synthesis of Longifoline from resorcinol. c) Gilbert-Stork synthesis of Griseofulvin from phloroglucinol. d) E.Wenkert's synthesis of β-vetivone from acetone. e) A.V. Ramarao synthesis of 4-demethoxydaunomycin from ethyl acetoacetate [9 L] 3.2 Prostaglandins: Classification, general structure and biological importance. Structure elucidation of PGE₁ PG_{1α}(synthesis not expected) [3L] 3.3 Insect growth regulators: General idea, structures of JH₂ & JH₃ [1L] 3.4 Plant growth regulators: Structural features & applications of arylacetic acids, gibberelic acids & triacontanol. Synthesis of Triacontanol(synthesis of stearyl magnesium bromide & 12-bromo-1-tetrahydropyranyloxydodecane expected) [2L]</p>	15L
04	<p>Dr.A.K.Upadhya y C.H.M.College 3.00p.m-6.00p.m 3.00p.m-5.00p.m</p>	<p>Tuesdays June:6,13,20,27 July:4,11,18,25 Aug: 1,8,22 Sep:5,12,19,26 Oct:3</p>	<p>Paper-II Synthetic organic chemistry Unit1:Name reactions with mechanism and application 1.1Mukaiyama esterification,Mitsunobu reaction, Baylis Hillman reaction, Suzuki coupling,Wacker process, Heck reaction, Sonogashira reaction. [7L] 1.2 Multicomponent reactions: Strecker synthesis, Hantzsch pyridine synthesis,Biginelli synthesis. Multicomponent reactions using alkyl isocyanides: Passerini and Ugi-4-component synthesis. [6L] 1.3 Domino/cascade reactions: Introduction with one example. [2L] Paper-I Theoretical organic chemistry-I 1.1 Organic reactive intermediates, methods of generation, structure, stability & important reactions involving carbocations, nitrenes, arynes & ketenes. [5L] 1.2 Neighbouring group participation: Mechanism & effects of anchimeric assistance, NGP by unshared/ lone pair electrons, π – electrons, aromatic rings, σ-bonds with special reference to bornyl & nonbornyl systems (formation of non- classical carbocation) [3L] Paper-I Unit-4: Photochemistry 4.1 Principles of photochemistry: Quantum yield, electronic states & transitions, selection rules, modes of dissipation of energy(Jablonski diagram), electronic energy transfer, photosensitization & quenching process. [3L] 4.2 Photochemistry of carbonyl compounds: $\pi \rightarrow \pi^*$, $n \rightarrow \pi^*$ transitions. Norrish-1 & Norrish-II cleavages, Paterno-Buchi reaction. Photoreduction, calculation of quantum yield, photochemistry of enones, photochemical rearrangements of α,β-unsaturated ketones & cyclohexadienones. Photo Fries rearrangement, Barton reaction. [8L] 4.3 Photochemistry of olefins: cis-trans isomerizations, hydrogen abstraction, addition & di-π-methane rearrangement including aza-di-π-methane. [2L] 4.4 Photochemistry of arenes: 1,2, 1,3 & 1,4-additions. [1L] 4.5 Singlet oxygen & photooxygenation reactions. [1L] Unit 4: Advanced spectroscopic techniques-I 4.1 IR Spectroscopy: Application in structure elucidation: Principle and applications of FT-IR [2L] 4.2 Nmr Spectroscopy: Application in structure elucidation. Relaxation phenomenon and relaxation time. First order, second order and higher order spectra. Methods of simplification of complex spectra. Double resonance, NOE, NOE difference spectroscopy and chemical shift reagents. Spin system notations, AB, AX, AB₂-AX₂, AMX and A₂B₂-A₂X₂ spin systems with suitable examples. Coupling in aromatic and heteroaromatic systems, long range coupling. Spectra of diastereotopic systems. FT-NMR spectroscopy: Pulse widths, spins & magnetization vectors. [7L]</p>	47L

	<p>Prof. P.R.Ponda C.H.M.College 2.00p.m-4.00p.m</p>	<p>Wednesdays June:14,21,28 July:5,12,19,26 Aug:2,9,16,23 Sep:6,13,20,27</p>	<p>Paper-I Unit-2: Pericyclic reactions 2.1 Cycloaddition reactions: $4n\pi$ & $(4n+2)\pi$ electron systems. Diels-Alder reaction. 1,3-dipolar cycloaddition and cheletropic reactions, ene reaction, retro-Diels- Alder reaction, regioselectivity, periselectivity, site selectivity & effect of substituents in Diels-Alder reactions. [7L] 2.2 Electrocyclic reactions: Conrotatory and disrotatory motions, $4n\pi$ & $(4n+2)\pi$ electron systems. [3L] 2.3 Sigmatropic rearrangements: H- 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. [5L] Unit-4 Biogenesis and biosynthesis of natural products 4.1 Biogenesis: Precursors, primary and secondary metabolites. Acetate hypothesis, Mevalonate & Shikimic acid pathways. [7L] 4.2 General Principles involved in the biosynthesis of amino acids, alkaloids,steroids and terpenoids. [3L] 4.3 Biosynthesis of selected natural products: L-tryptophan, cholesterol, ephedrine, citronello [5L]</p>	<p>30L</p>
<p>06</p>	<p>Dr. D.N. Shinde C.H.M.College 4.00p.m-5.00p.m</p>	<p>Wednesdays June:14,21,28 July:5,12,19,26 Aug:2,9,16,23 Sep:6,13,20,27</p>	<p>Unit 2: Biomolecules-I 2.1 Amino acids, peptides and proteins:Chemical and enzymatic hydrolysis of proteins to peptides, amino acid sequencing. Secondary structure of proteins, forces responsible for holding of secondary structures, α- helix,β- sheets, super secondary structure. Tertiary structure of protein: folding and domain structure, quaternary structure [4L] 2.2 Nucleic acids: Structure and Function of physiologically important nucleotides(c-AMP, ADP, ATP) and nucleic acids (DNA and RNA) replication, genetic code, protein biosynthesis , mutation. [6L] 2.3 Chemical synthesis of oligonucleotides: Phosphodiester, phosphotriester, phosphoramidite and H- phosphonate methods including solid phase approach. [5L]</p>	<p>15L</p>
<p>07</p>	<p>Dr. Sandeep Kotwal C.H.M.College 2.00p.m-4.00p.m</p>	<p>Thursdays June: 15, 22, 29 July: 6,13,20,27 Aug: 3,10,24,31 Sep: 7,14,21,28</p>	<p>Paper-IV Unit-3 3.1 Chemistry of enzymes: Introduction, nomenclature, classes and general types of reactions catalyzed by enzymes. Properties of enzymes: i)Enzyme efficiency/ catalytic enzyme kinetics ii)Enzyme specificity; Fischer's lock and key and Koshland's ' induced fit' hypothesis. Concept and identification of active site. 3.2 Factors affecting enzyme kinetics: Substrate concentration, enzyme concentration, temperature, ppH, product concentration etc. Reversible and irreversible inhibition. 3.3 1. Mechanism of enzyme action: transition action, transition-state theory, orientation and steric effect, acid -base catalysis, strain or distortion. Mechanism of chymotrypsin catalyzed hydrolysis of a peptide bond. Enanamines and Ylides. 2. Methods of reparation of anamines: condensation of secondary amine and aldehyde or ketone reaction between alkynes and secondary amines. Comparison of reactivity of anamines and enolates. Reactions of enamines including asmmetic reactions of chiral anamines derived from chiral secondary amines. 3. Phosphorus, sulphur and nitrogen ylides: Preparation, structure and comparison of reactivity. Reactions of phosphorus, sulphur and nitrogen ylides with carbonyl compounds, including mechanism and stereochemistry. Wittig reaction, Wittig- Horner reaction. 4. α C-H activation bt nitro, sulfoxide, sulphone and phosphonate groups: generation of carbanions by strong bases(LDA/ n-butyl lithium) and applications of C-C bond formation. Bamford-Stevens reaction, Julia olefination and it's modification, Bestmann- Ohira reagent, Barton-Kellog olefination, Steven's rearrangement.</p>	<p>30L</p>

	Dr. Nagesh Sutar C.H.M. College 3.00p.m-4.00p.m	Fridays July: 7,14,21,28 Aug: 4,11,18 Sep: 1,8,15, 22, 29	Paper-IV Medicinal & bio- organic chemistry Paper-IV Unit-I Drug discovery & development 1.2 Procedures in drug design: Drug discovery without lead: Penicillin, Librium. Random screening, non-random(or targeted) screening. Drug 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] Paper-III Unit4,4.3 : ^{19}F and ^{13}P -NMR spectroscopy: Principles and applications. [2L] 4.4 Problems based on combined use of IR and PMR spectroscopic techniques. [2L]	12L
09	Dr. D.R. Ambavadekar B.N.B College(Thane 3.00p.m-4.00pm	Saturdays June: 17, 24 July: 1,8,15,22, 29 Aug: 5,12,19 Sep: 9,16,23 Oct: 7,14	Unit-4 Metal/ Nonmetals in organic synthesis 4.1 Mercury in organic synthesis: oxymercuration and demercuration of alkenes, mechanism and regiochemistry, solvomercuration, mercuration of aromatics and transformation of aryl-mercurials to aryl halides. [2L] 4.2 Organoboron compounds: Applications of organo-boranes, generation of diboranes, hydroboration of alkenes and alkynes: mechanism, regiochemistry, stereochemistry, asymmetric hydroboration using chiral boron reagenys and functional group reduction of diborane. [3L] 4.3 Organosilicons: Important features of silicon governing the reactivity of C-Si compounds, preparation and important bond forming reactions of alkyl silanes, alkenyl silanes, aryl silanes [10L]	15L
10	Dr. A. Goswami B.N.B. College Thane 4.00p.m-5.00p.m	Saturdays June: 17, 24 July: 1,8,15,22, 29 Aug: 5,12,19 Sep: 9,16,23 Oct: 7,14	Unit-3: Stereochemistry-I 3.1 Classification of point groups based on symmetry elements with examples (non mathematical) treatment 3.2 Conformational analysis of medium rings: Eight and ten membered rings and their unusual properties, I- strain, transannular reactions. 3.3 Stereochemistry of fused ring and bridged ring compounds: decalins, hydrindanes, steroids and Bredt's rule. [4L] 3.4 Dynamic stereochemistry: Selection of substrate, Curtin-Hammett principle, effect of conformation on reactivity of cyclohexane derivatives in the following reactions (including mechanism); electrophilic addition, nucleophilic substitution, elimination, molecular rearrangements, reduction of cyclohexanones and oxidation of cyclohexanols.	15L

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.

21st June, 2017.

P. S. Jhannale
Assistant Registrar
UG/PG Section

P.S. Teacher participating in the scheme of Post-graduate teaching and Instruction for course in the subject of Organic Chemistry are hereby requested to submit the attendance rolls in respect of the lectures delivered by them during the academic year 2017-2018 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 Organic Chemistry are hereby informed that no change will be permitted in the venue and timings of the lectures.

No.PG/2/ICD/2017-18/666 of 2017.

21st June, 2017.

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 Organic Chemistry for information and necessary action.

Mumbai-400 032.
21st June, 2017.

P. S. Jhannale
Assistant Registrar
UG/PG Section
19/6/17