M. Sc. I (SEMESTER-I) MICROBIOLOGY 2017-2018

NOTE: Attention of post-graduate students M.Sc. I (Semester-I) 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.
16th January, 2018.

Sd/-
Assistant Registrar
U.G. & P.G. Section

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P.S. Students registered for M.Sc. I (Semester-I) course in **Microbiology** are requested to attend their lectures as per the above time table. Teacher participating in the scheme of Post-graduate teaching and Instruction for course in the subject of **Microbiology** 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 **Microbiology** are hereby informed that no change will be permitted in the venue and timings of the lectures.

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No.PG/ICD/1865 of 2017-18.

16th January, 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 **Microbiology** and the Principals of the respective colleges for information and necessary action.

Mumbai–400 032.
16th January, 2018.

Assistant Registrar
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TIME TABLE OF POST-GRADUATES FOR THE M.Sc. [SEM IV] STUDENTS IN ORGANIC CHEMISTRY AT ZONE I AND II DIVISION FOR THE YEAR 2017-18. [D.G. Ruparel college]

Lectures will commence from : - 5th January 2018 **Coordinator: Dr. R.V. Rele (Ruparel college)**

Semester IV

Sr. No.	Name of the professor	Days and dates	Paper and topic/unit
01	**Dr. K.J. Chavan (Ruparel college)**	**Monday 2.30 to 4.30 p.m.** Jan: 22, 29, Feb: 5, 12, 26 Mar: 5, 12	**Paper IV: Unit 4: Green chemistry [15L]** **4.1:** Introduction, basic principles of green chemistry. Designing a green synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts. **[1L]** **4.2:** Use of the following in green synthesis with suitable examples: a) Green reagents: dimethylcarbonate, polymer supported reagents. b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phase transfer catalysts [Aliquat 336, benzyltrimethyl ammonium chloride (TMBA), Tetra-n-butyl ammonium chloride, crown ethers], biocatalysts. c) Green solvents: water, ionic liquids, deep eutectic solvents, supercritical carbon dioxide. d) Solid state reactions: solid phase synthesis, solid supported synthesis. e) Microwave assisted synthesis: reactions in water, reactions in organic solvents, solvent free reactions. f) Ultrasound assisted reactions. **[10L]** **4.3:** Comparison of traditional processes versus green processes in the syntheses of ibuprofen, adipic acid, 4-aminodiphenylamine, p-bromotoluene and benzimidazole. **[4L]**
02	**Dr. (Mrs.) Pallavi Tiwari (S.I.E.S. College)**	**Monday 4.30 to 6.00 p.m.** Jan: 22, 29, Feb: 5, 12, 26 Mar: 5, 12	**Paper III: Unit 4: Advanced spectroscopic techniques [15L]** **4.1: ^{13}C –NMR spectroscopy:** Introduction, ^{13}C- chemical shifts, calculation of ^{13}C-chemical shifts, proton coupled ^{13}C - spectra, proton decoupled ^{13}C- spectra. Off-resonance decoupling, DEPT technique, hetero-nuclear coupling of carbon to ^{19}F and ^{31}P. **[4L]** **4.2: Two-dimensional NMR spectroscopy:** Introduction, COSY and HETCOR techniques, (including interpretation of COSY and HETCOR spectra). NOESY and ROESY techniques. **[4L]** **4.3 : Problems** based on combined use of spectroscopic techniques/ advanced techniques.

			4.5: Applications of NMR in medicine. **[1L]**
03	**Prof. (Mrs.) Gomathi Shridhar (Menon college)**	**Tuesday 2.30 to 4..30 p.m.** Jan: 23, 30, Feb: 6, 20, 27 Mar: 6, 13	**Paper II: Unit 2: Designing organic synthesis [15L]** **2.1:** Methodology in organic synthesis: convergent and divergent synthesis, functional group interconversions, general methods of synthesis of 4 -7 membered rings, disconnection approach and retrosynthetic analysis, idea of synthons and synthetic equivalents . Retrosynthesis of acyclic saturated and unsaturated systems, monocyclic, bicyclic and aromatic compounds. **[11L]** **2.2:** Synthesis of some complex molecules: synthetic routes based on retrosynthetic analysis for following molecules: prostaglandin A_2, atropine and camphor. **[4L]**
04	**Dr. (Mrs.) S. Dasgupta (Jai-hind college)**	**Tuesday 4.30 to 6.00 p.m.** Jan: 23, 30, Feb: 6, 20, 27 Mar: 6, 13	**Paper III: Unit 1: Heterocyclic compounds-II [15L]** Reactivity, important methods of synthesis and general reactions of the following heterocycles: pyridines, pyridine-N-oxide, pyridazines, pyrimidines, pyrazines, s-triazines, quinolines, isoquinolines, indoles, purines, oxazines, coumarins. **[15L]** **[4L]**
05	**Prof. (Mrs.)Indu Shastri (National College)**	**Wednesday 2.30 to 4..30 p.m.** Jan: 24, 31, Feb: 7, 14, 28 Mar: 7, 14	**Paper I: Unit 1: Physical organic chemistry [15L]** **1.1** Structural effects and reactivity: Linear free energy relationship (LFER) in determination of organic reaction mechanism, The Hammett equation, substituent constants, theories of substituent effects, interpretation of σ-values, reaction constants ρ, Yukawa-Tsuno equation. **[7L]** **1.2** Uses of Hammett equation, deviations from Hammett equation. Dual parameter correlations, Inductive substituent constants. The Taft model, σ_I and σ_R scales, steric parameters Es and β. Solvent effects, Okamoto-Brown equation, Swain-Scott equation, Edward and Ritchie correlations, Grunwald-Winstein equation, Dimroth's E_T parameter. **[8L]**
06	**Prof. (Mrs.) Kiran Jathar (national college)**	**Wednesday 4.30 to 6..00 p.m.** Jan: 24, 31, Feb: 7, 14, 28 Mar: 7, 14	**Paper I: Unit 3: Stereochemistry- II [15L]** **3.1** Racemisation and resolution: Mechanism of racemisation, methods of resolution: chemical, kinetic and equilibrium asymmetric transformation and through inclusion compounds. **[3L]** **3.2** Determination of enantiomer and diastereomer composition: Isotope dilution method, enzymatic method, chromatographic methods. Methods based on NMR spectroscopy: use chiral derivatising agents (CDA), chiral solvating agents (CSA) and Lanthanide shift reagen (LSR). **[3L]**

			3.4 Molecular dissymmetry and chiroptical properties: Linearly and circularly polarized ligh Circular birefringence and circular dichroism. ORD and CD curves. Cotton effect and its applications. The octant rule and the axial α–haloketone rule with applications. **[5L]**
07	**Prof. B.k. N. Singh (jai- hind college)**	**Thursday 2.30 to 4.30 p.m.** Jan: 25, Feb: 1,8, 15, 22 Mar:1, 8	**Paper II: Unit 4: Transition and rare earth metals in organic synthesis [15 L]** **4.1** Introduction, basic concepts, 18 electron rule, bonding in transition metal complexes, oxidative addition, reductive elimination, migratory insertion. **[3L]** **4.2** Palladium in organic synthesis: π-bonding of Pd with olefins, applications in C-C bond formation, carbonylation, alkene isomerisation, cross coupling of organometallics and halides. Catalysis of cycloaddition reactions and heteroatom coupling to produce bonds between aryl/vinyl groups and N, S or P atoms. **[3L]** **4.3** Olefin metathesis using Grubb's catalyst. **[1L]** **4.4** Applications of nickel, cobalt, iron, rhodium and chromium carbonyls in organic synthesis. **[4L]** **4.5** Applications of samarium iodide including reduction of organic halides, aldehydes and ketones, α-functionalised carbonyl compounds and nitro compounds. **[1L]** **4.6** Applications of Cerium (IV) in synthesis of heterocyclic quinoxaline derivatives and its role as a deprotecting agent. **[1L]** **4.7** $Sc(OTf)_3$ and $Yb(OTf)_3$ as water tolerant Lewis acid catalysts in aldol condensation, Michael reaction, Diels-Alder reaction, Friedel-Crafts reaction, oxidation reactions. **[2L]**
08	**Dr. Juliet Miranda**	**Thursday 4.30 to 6.00 p.m.** Jan: 25, Feb: 1,8, 15, 22 Mar:1, 8	**Paper III : Unit 3: Natural products-IV [15L]** **3.1 Vitamins:** Classification, sources and biological importance of vitamin B_1, B_2, B_6, folic acid, B_{12}, C, D_1, E (α-tocopherol), K_1, K_2, H (β- biotin). Synthesis of the following: Vitamin B_1 including synthesis of pyrimidine and thiazole moieties Vitamin B_2 from 3, 4-dimethylaniline and D(-)ribose Vitamin B_6 from: 1) ethoxyacetylacetone and cyanoacetamide 2) ethyl ester of N-formyl-DL-alanine(Harris synthesis) Vitamin E (α-tocopherol) from trimethylquinol and phytyl bromide Vitamin K_1 from 2-methyl-1, 4-naphthaquinone and phytol. **[7L]** **3.2 Antibiotics:** Classification on the basis of activity. Structure elucidation of penicillin-G and cephalosporin-C. Synthesis of penicillin-G and phenoxymethylpenicillin from D-penicillamine and t-butyl phthalimide malonaldehyde (synthesis of D-penicillamine and t-butyl phthalimide malonaldehyde expected). **[6L]** **3.3 Naturally occurring insecticides:** Sources, structure and biological properties of pyrethrums (pyrethrin I), rotenoids (rotenone), azadirachtin. Synthesis of pyrethrin I.**[2L]**

	(Wilson college)	**2.30 to 4.30 p.m.** Jan:19, Feb: 2,9, 16, 23 Mar:9, 16	**2.1** Chemistry of coenzymes. Structure, mechanism of action and bio-modeling studies of the following coenzymes: nicotinamide adenine dinucleotide, flavin adenine dinucleotide, thiamine pyrophosphate, pyridoxal phosphate, Vitamin B_{12}, biotin, lipoic acid, Coenzyme A. **[12L]** **2.2** Oxygen activation in biological systems with reference to cytochromes. **[3L]**
10	**Dr. (Ms.) M. kulkarni** **M.D. College**	**Friday** **4.30 to 6.00 p.m.** Jan:19, Feb: 2,9, 16, 23 Mar:9, 16	**Paper II : Unit 1: Radicals in organic synthesis [15 L]** **1.1** General aspects: Electrophilic and nucleophilic radicals and their reactivity with π-rich/deficient olefins. **[1L]** **1.2** Inter- and intramolecular aliphatic C-C bond formation using tin hydride, carbon hydride, thio donor (Barton's reaction). **[2L]** **1.3** Cleavage of C-X, C-Sn, C-Co and C-S bonds in the generation of radicals. **[3L]** **1.4** Trapping by electron transfer reactions using manganese triacetate. **[1L]** **1.5** Radical –radical processes: oxidative couplings, single electron oxidation of carbanions to generate radicals, dehydrodimerization and reductive couplings. **[3L]** **1.6** C-C bond formation in aromatics: Introduction, electrophilic and nucleophilic radical reactions on aromatics, radical reactions on heteroaromatics: alkylations and acylations **[3L]** **1.7** Hunsdiecker halodecarboxylation, autooxidation **[2L]**
11	**Dr. Suraj Purandare** **(Siddarth college)**	**Monday to Friday** **3.00 to5.30 p.m.** March: 19, 20,21,22,23,24	**Paper I : Unit 4: Asymmetric synthesis [15L]** **4.1** Principles of asymmetric synthesis: Introduction, the chiral pool in Nature, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions. **[3L]** **4.2** Synthesis of α-amino acids (Corey's diastereoselective hydrogenation of cyclic hydrazones), synthesis of L-DOPA [Knowles's Mosanto process]. **[1L]** **4.3** Asymmetric reactions with mechanism: Aldol and related reactions including Cram's rule, Sharpless enantioselective epoxidation, hydroxylation, aminohydroxylation, Diels-Alder reaction, reduction of prochiral carbonyl compounds and olefins. **[8L]** 4.4 **Use of chiral auxiliaries in diastereoselective reductions, asymmetric amplification . Use of chiral BINOLs, BINAPs and chiral oxazolines and oxazolidines in asymmetric transformations.** [3L]
12	**Dr. Priti Khedkar** **(Khalasa college)**	**Saturday** **2.30 to 4.30 p.m.**	**Paper I : Unit 2: Supramolecular chemistry [15L]** **2.1** Principles of molecular associations and organizations as exemplified in biological

			receptors with multiple hydrogen sites. [3L] **2.3** Structures and properties of crown ethers, cryptands, cyclophanes, calixarenes, rotaxanes and cyclodextrins. Synthesis of crown ethers, cryptands and calixarenes [6L] **2.4** Molecular recognition and catalysis, molecular self assembly. [3L]
13	**Prof . Karun Sodha (K.C. College)**	**Saturday 4.30 to 6.00 p.m.** Feb: 3,10, 17, 24 Mar:3,	**Paper II: Unit 3: Newer methods in organic synthesis [15L]** **3.1** Basic principles and applications of the following in organic synthesis: Crown ethers, cryptands, micelles, cyclodextrins, clay and zeolites and phase transfer catalysts. [9L] **3.2** Introduction to polymer supported reagents and organocatalysts. [3L] **3.3** Principles and applications of ultrasound and microwaves in organic synthesis.[3L]
14.	**(To be announced later)**	**(To be announced later)**	**Paper 3 : Unit 2: Natural products-III [15L]** **2.1 Steroids:** General structure, classification. Occurrence, biological role, important structural and stereochemical features of the following: corticosteroids, steroidal hormones, steroidal alkaloids, sterols and bile acids. [5L] **2.2** Synthesis of 16-DPA from cholesterol and plant sapogenin. [2L] **2.3** Synthesis of the following from 16-DPA: androsterone, testosterone, oestrone, oestriol, oestradiol and progesterone. [5L] **2.4** Synthesis of cinerolone, jasmolone, allethrolone, exaltone and muscone. [3L]
15.	**(To be announced later)**	**(To be announced later)**	**Unit 3: Biomolecules – IV [15L]** **3.1** Role of main enzymes involved in the synthesis and breakdown of glycogen. [2L] **3.2** Enzyme catalyzed organic reactions: Hydrolysis, hydroxylation, oxidation and reduction. [6L] **3.3** Enzymes in organic synthesis. Fermentation: Production of drugs/ drug intermediates by fermentation. Production of chiral hydroxy acids, vitamins, amino acids, β-lactam antibiotics. Synthesis of chemicals via microbial transformation, synthesis of L-ephedrine. Chemical processes with isolated enzymes in free form (hydrocyanation of m-phenoxybenzaldehyde) / immobilized form (production of 6-aminopenicillanic acid). [7L]

			Paper IV: Unit 1: Drug design, development and synthesis: [15L] **1.1** Introduction to Quantitative Structure Activity Relationship studies. QSAR parameters - Steric effects: The Taft and other equations; Methods used to correlate physicochemical parameters with biological activity: Hansch analysis - A linear multiple regression analysis.[5L] **1.2** Introduction to modern methods of drug design and synthesis - computer-aided molecular graphics based drug design, drug design via enzyme inhibition (reversible and irreversible), biotechnology and drug design. [3L] **1.3** 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]** **1.4** Synthesis and application of the following drugs: Fluoxetine, oxyphenbutazone, cetrizine, esomeprazole, fluconazole, zidovudine, methotrexate, diclofenac, labetalol, fenofibrate.

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P.S. Jhumale

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