

POST GRADUATE DEPARTMENT
UNIVERSITY OF MUMBAI, FORT CAMPUS

Time Table of Post-Graduate lectures for M.Sc. Part-II Semester-III: Inorganic Chemistry at Zone 1& 2 for the year 2018-2019
(Lectures will commence from 10th August 2018, at WILSON COLLEGE)

PAPER-1. Chemistry of Inorganic Solids			
TO BE ANNOUNCED Friday (2.00-4.00pm)	Aug-10,17,24,31 Sept-7,14,21,28	Paper-I : Unit-I 15 Lectures	Descriptive Crystal Chemistry (a) Simple structures Structures of AB type compounds (PbO and CuO), AB ₂ type (β cristobalite, CaC ₂ and Cs ₂ O), A ₂ B ₃ type (Cr ₂ O ₃ and Bi ₂ O ₃), AB ₃ (ReO ₃ , Li ₃ N), ABO ₃ type, relation between ReO ₃ and perovskite BaTiO ₃ and its polymorphic forms, Oxide bronzes, ilmenite structure, AB ₂ O ₄ type, normal, inverse, and random spinel structures. (b) Linked Polyhedra (i) Corner sharing: tetrahedral structure (Silicates) and octahedral structure (ReO ₃) and rotation of ReO ₃ resulting in VF ₃ , RhF ₃ and calcite type structures. (ii) Edge sharing: tetrahedral structures (SiS ₂) and octahedral structures (BiI ₃ and AlCl ₃). pyrochlores, octahedral tunnel structures and lamellar structures
Dr.H.A.Parbat Wilson College Saturday (4.00-6.00pm)	Aug-11,18,25, Sept-1,8,15,22,29	Paper-I : Unit-II 15 Lectures	Imperfection in crystals and Non- Stoichiometry (a) Point defects: Point defects in metals and ionic Crystal – Frenkel defect and Schottky defect. Thermodynamics formation of these defects (mathematical derivation to find defect concentration and numerical problems expected); Defects in non-Stoichiometric compounds, colour centres. (b) Line defects: Edge and Screw Dislocations. Mechanical Properties and Reactivity of Solids. (c) Surface Defects: Grain Boundary and Stacking Fault. Dislocation and Grain Boundaries, Vacancies and Interstitial Space in Non-Stoichiometric Crystals, Defect Clusters, Interchangeable Atoms and Extended Atom Defects
Dr.S.Z.Bootwala Wilson College Thursday (4.00-6.00pm)	Aug-16,23,30 Sept-6,13,20,27, Oct-4	Paper I: Unit:III 15 Lectures	Inorganic Materials-I: Preparations (a) Methods of Synthesis: Chemical Method, High Pressure Method, Arc Technique and Skull Method (with examples). (b) Different methods for single crystal growth: (i) Crystal Growth from Melt–: Bridgman and Stockbargar, Czochralski and Vernuil methods.

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			(ii) Crystal growth from liquid solution: Flux growth and temperature gradient methods (iii) Crystal growth from vapour phase: - Epitaxial growth methods. (c) Thin film preparation: Physical and Chemical methods. (d) Solid Solutions: Formation of Substitutional, Interstitial and Complex Solid Solutions; Mechanistic Approach; Study of Solid solutions by X-ray Powder Diffraction and Density Measurement.
Prof. Abhimanyu.K. Yadav Khalsa College Saturday (2.00-4.00pm)	Aug-11,18,25, Sept-1,8,15,22,29	Paper-I: Unit-IV 15 Lectures	Behaviour of Inorganic Solids : Properties (a) Diffusion in Solids: Fick's Laws of Diffusion (numerical problems expected); Kirkendal Effect; Wagner mechanism Diffusion and Ionic Conductivity; Applications of Diffusion in Carburizing and non-Carburizing Processes in Steel Making. (b) Solid state reactions: General principles and factors influencing reactions of solids, Reactivity of solids. (c) Liquid Crystals: Introduction and classification of thermotropic liquid crystals, Polymorphism in liquid crystal, Properties and applications of liquid crystals. (d) Optical properties: Colour Centres and Birefringence; Luminescent and Phosphor Materials; Coordinate Model; Phosphor Model; Anti Stokes Phosphor; Ruby Laser; Neodymium Laser.
PAPER- 2. Bioinorganic and Coordination Chemistry.			
Dr. S.Z. Bootwala Wilson College Monday (2.00-4.00pm)	Aug-13,20,27, Sept-10,17,24, Oct-1,8	Paper-II: Unit-I 15 Lectures.	(i) Coordination geometry of the metal ion and functions. (ii) Zn in biological systems: Carbonic anhydrase, protolytic enzymes, e.g. carboxy peptidase, Zinc finger. (iii) Role of metal ions in biological electron transfer processes ;iron sulphur protein (iv) Less common ions in biology e.g. . Mn (arginase; structure and reactivity), Ni (urease ; structure and reactivity) (v) Metallothionines Biomineralization.
Dr. S.Z. Bootwala Wilson College	Aug-29 Sept-	Paper-II: Unit-II	Reactivity of Chemical Species-I (15Lectures) (i) Recapitulation of the definition of Lewis acids and bases, Classification of Lewis acids and bases based on

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Wednesday (2.00-4.00pm)	1,8,15,22,29 Oct-3,10.	15 Lectures	frontier Molecular orbital topology, Reactivity matrix of Lewis acids and bases (ii) Group Characteristic of Lewis acids (Gp-1,13-17) (iii) Pauling rules to determine the strength of oxoacids; classification and Structural anomalies.
Dr. H.A.Parbat Wilson College Wednesday (4.00-6.00pm)	Aug-29 Sept- 1,8,15,22,29 Oct-3,10.	Paper-II: Unit-III 15 Lectures	Reactivity of Chemical Species-II (i) Pourbaix Diagrams. (ii) Amphoteric behavior, Periodic trends in amphoteric properties of p-block and d-block elements (iii) Oxoanions and Oxocations. (iv) Measures of hardness and Softness of Acids and Bases, Drago-wayland equations (v) Applications of acid-base Chemistry: Super acids and Super bases, heterogeneous acid-base reactions
Dr. S.Z. Bootwala Wilson College Tuesday (4.00-6.00pm)	Aug-14,21,28 Sept-4,11,18,25 Oct-9	Paper-II: Unit-IV 15 Lectures	Synthesis, Structure and Bonding, and Stereochemistry (a) Structure and Bonding (i) Molecular Orbital Theory for Complexes with Coordination Number 4 and 5 for the central ion (sigma as well as Pi bonding) (ii) Angular Overlap Model (b) Stereochemistry of Coordination Compounds (i) Chirality and Fluxionality of Coordination Compounds with Higher Coordination Numbers. (ii) Geometries of Coordination Compounds from coordination number 6 to 9.
PAPER- 3. Spectral Methods in Inorganic Chemistry			
Dr.H.A.Parbat Wilson College Thursday (2.00-4.00pm)	Aug-16,23,30 Sept- 6,13,20,27, Oct-4	Paper-III: Unit-I 15 Lectures	Diffraction Methods-I X-Ray Diffraction: Bragg Condition; Miller Indices; Laue Method; Bragg Method; Debye Scherrer Method of X-Ray Structural Analysis of Crystals

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Dr.H.A.Parbat Friday (4.00-6.00pm)	Aug-10,17,24,31 Sept-7,14,21,28	Paper-III: Unit-II 15 Lectures	Diffraction Methods-II (a) Electron Diffraction: Scattering of electrons, Scattering Intensity versus Scattering Angle, Weirll Measurement Technique, Elucidation of Structures of Simple gas Phase Molecules (b) Neutron Diffraction: Scattering of Neutrons: Scattering of neutrons by Solids and Liquids, Magnetic Scattering, Measurement Technique.
Dr. H.A.Parbat Wilson College Monday (4.00-6.00pm)	Aug-13,20,27, Sept-10,17,24, Oct-1,8	Paper-III: Unit-III 15 Lectures	Electron Spin Resonance Spectroscopy (a) Electron behaviour, interaction between electron spin and magnetic field. (b) Instrumentation: Source, Sample cavity. Magnet and Modulation coils, Microwave Bridge, Sensitivity. (c) Relaxation processes and Line width in ESR transitions: (i) ESR relaxation and chemical bonding. (ii) Interaction between nuclear spin and electron spin (hyperfine coupling) (iii) Spin polarization for atoms and transition metal ions, (iv) Spin-orbit coupling and significance of g-tensors, (v) Application to transition metal complexes (having one unpaired electron)
Dr.H.A.Parbat Wilson College Tuesday (2.00-4.00pm)	Aug-14,21,28 Sept-4,11,18,25 Oct-9	Paper-III: Unit-IV. 15 Lectures	Mossbauer Spectroscopy : 3.4.1 Basic principle, recoil energy and Doppler shift 3.4.2 Instrumentation: sources and absorber; motion devices, detection, reference substances and calibration 3.4.3 Isomer shift, quadrupole interaction, magnetic interaction electronegativity and chemical shift 3.4.4 Applications: <i>Iron compounds</i> - low spin and high spin Fe(II) and Fe(III) compounds and complexes, effect of pi-bonding, mono and polynuclear Iron complexes, spinel oxides and iron-sulphur proteins; <i>Tin compounds</i> - tin halides and tin oxides, organotin compounds; <i>Iodine compounds</i> - I ₂ and alkali metal iodide compounds

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M. Sc. Part II (SEM. III) INORGANIC 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.
8th August, 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/2018-19/555 of 2018.

8th August, 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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Assistant Registrar
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