

UNIVERSITY OF MUMBAI

Time Table of Post-Graduate lectures for M.Sc. semester-IV students in Inorganic Chemistry at Zone 1& 2 for the year 2016-2017

(Lectures will commence from 21st November 2016)

INORGANIC CHEMISTRY

Paper-I			
DAY/DATE	Name of the Teacher/College	Paper/Unit/No.of Lectures	Topic
<u>Tuesday: 4.00-6.00pm</u> Nov : 22,29 Dec: 6, 13, 20. Jan : 3,10,17	Dr.S.Z.Bootwala Wilson College	Paper-I /Unit-I 15 Lectures	Inorganic Materials- Properties-II Electrical properties of solids:(a)Conductivity: Solid Electrolytes; Fast Ion Conductors; Mechanism of Conductivity; Hopping Conduction. (b) Other Electrical Properties: Thomson and Seebeck Effects; Thermocouples and their Applications; Hall Effect; Dielectric, Ferroelectric, Piezoelectric and Pyroelectric Materials and their Inter-relationships and Applications
<u>Tuesday: 2.00-4.00pm</u> Nov : 22,29 Dec: 6, 13, 20. Jan : 3,10,17	Prof. A.K. Yadav Khalsa College	Paper-I /Unit-II 15 Lectures	Inorganic Materials-Properties-III (a) Magnetic Properties: Structure and Properties of Metals and Alloys; Transition Metal Oxides; Spinels; Ilmenites; Perovskite and Magneto plumbites. (b) Thermal Properties: Introduction, Heat Capacity and its Temperature Dependence; Thermal Expansion of Metals; Ceramics and Polymers and Thermal Stresses
<u>Friday: 4.00-6.00pm.</u> Nov : 25 Dec: 2, 9, 16, 23. Jan : 6,13,20,	Dr. H.A.Parbat Wilson College	Paper-I /Unit-III 15 Lectures	Applications of group theory- electronic structures (a) Molecular Orbital Theory of Inorganic Compounds, Transformation Properties of Atomic Orbitals; sigma and pi- molecular orbitals for AB, AB ₂ , AB ₃ molecules; (b) Molecular orbitals for inorganic cage and cluster compounds such as B ₆ H ₆ , metal sandwich compounds such as ferrocene and dibenzene chromium.
<u>Saturday: 4.00-6.00 pm.</u> Nov : 26 Dec: 3,10,17. Jan : 7,14,21,28.	Dr. H.A.Parbat Wilson College	Paper-I/ Unit-IV 15 Lectures	Application of Group Theory-Spectral properties (a) Ligand Field Theory: Electronic structures of Free Atoms and Ions; Splitting of Levels and Terms in a Chemical Environment; Construction of Energy Level Diagrams; (b) Correlation Diagrams for d ² ions in octahedral and tetrahedral ligand field; Method of Descending Symmetry; Hole Formalism. (c) Molecular Vibrations: The Symmetry of Normal Vibrations; Determining the Symmetry Types of the Normal Modes; Selection Rules for Fundamental Vibrational Transitions and Interpretation of IR and Raman Spectra

PAPER-II			
DAY/DATE	Name of the Teacher/College	Paper/Unit/No.of Lectures	Topic
		Paper-II	Organometallics and main group chemistry
<u>Wednesday: 2.00-4.00</u> Nov : 23,30 Dec: 7, 14, 21. Jan : 4,11,18	Dr. S.Z.Bootwala Wilson College	Paper-II/Unit-I / 15 Lectures	Organometallic Chemistry (a) Organometallic Chemistry of <i>f</i> - block Elements, (b) Metal-Metal Bonding and Metal Clusters, (c) Electron Count and Structures of Clusters,, (d) Isolobal Analogy and Structures., (e) Organo Palladium and Organo Platinum Compounds: Synthesis and Applications.
<u>Thursday : 2.00-4.00</u> Nov : 24 Dec: 1, 8, 15, 22. Jan : 5,12,19	Dr. S.Z.Bootwala Wilson College	Paper-II/Unit-II/ 15 Lectures	Applications of Organometallic Compounds (a) Catalysis-Homogenous and Heterogenous Catalysis: Comparison, Fundamental Reaction Steps. (b) Organometallics as Catalysts in Organic Reactions: (i) Hydrogenation, (ii) Assymmetric Hydrogenation, (iii) Hydroamination. (c) Organometallic compounds in medicine and agriculture and their biological and environmental Aspects
<u>Monday:4.00-6.00pm</u> Jan: 16,23,30 Feb: 6,13,20,27	Dr. Bina Arora M.D.College	Paper-II/Unit-III/ 15 Lectures	Inorganic cluster and cage compounds (i) Introduction, (ii) Bonding in boranes, (iii) Heteroboranes, (iv) Carboranes, (v) cluster compounds, (vi) electron precise compounds and their relation to clusters.
<u>Saturday: 2.00-4.00 pm.</u> Nov : 26 Dec: 3, 10, 17. Jan : 7,14,21,28.	Dr. S.Z.Bootwala Wilson College	Paper-II/Unit-IV /15 Lectures	Inorganic ring and chain compounds (a) Silicates, polysilicates and aluminosilicates, (b) Phosphazenes, phosphazene polymers (c) Polyanionic and polycationic compounds

Paper-III			
DAY/DATE	Name of the Teacher /College	Paper/Unit/No. of Lectures	Topic
<u>Wednesday: 2.00-4.00</u> Jan : 25. Feb: 1,8, 15,22 March: 1,8,15	Dr. S.Z.Bootwala Wilson College	Paper-III/Unit-II/ 15 Lectures	Microscopy of Surface Chemistry- Introduction to surface spectroscopy, Microscopy, problems of surface analysis, distinction of surface species., sputter etching and depth profile and chemical imaging, instrumentation, Ion scattering Spectra(ISS), secondary Ion Mass spectroscopy(SIMS), Auger Emission Spectroscopy(AES).
<u>Thursday : 2.00-4.00</u> Feb: 2,9,16,23 March: 2,9,16,23	Dr. S.Z.Bootwala Wilson College	Paper-III/Unit-III/ 15 Lectures	Microscopy of Surface Chemistry-II ESCA, Scanning Electron Microscopy (SEM), Atomic force microscopy (AFM) and transmission electron microscopy (TEM): Instrumentation and applications.
<u>Wednesday: 4.00-6.00</u> Nov : 23,30 Dec: 7, 14, 21. Jan : 4,11,18	Dr. H.A.Parbat Wilson College	Paper-III/Unit-IV 15 Lectures	Thermal Methods (a) Introduction to principles and Instrumentation of thermoanalytical techniques including thermogravimetry (TG), differential thermal analysis (DTA), differential scanning calorimetry (DSC), thermomechanical analysis (TMA), simultaneous thermal analysis (STA) and evolved gas analysis (EGA). (b) Applications of thermal techniques for the acquisition of rate dependent kinetic parameters such as activation energy, pre-exponential factor, etc. for solid-solid polymorphic transformation and their relevance. (c) Determination of thermodynamic parameters such as heat capacity, standard enthalpy of formation of the compounds and Gibbs free energy change for the reaction employing thermoanalytical measurements. (d) Application of thermal techniques in materials science and industry
<u>Thursday : 4.00-6.00</u> Nov : 24 Dec: 1, 8, 15, 22. Jan : 5,12,19	Dr. H.A.Parbat Wilson College	Paper-III/Unit-I/ 15 Lectures	Instrumental methods of analysis-I (a) Vibrational Spectroscopy: (i) Symmetry and shapes of AB ₂ , AB ₃ , AB ₄ , AB ₅ and AB ₆ molecules. (ii) Mode of bonding of ambidentate ligands. (iii) Applications of vibrational and Raman spectroscopy for the study of active sites of metalloproteins. (b) NMR spectroscopy of Inorganic compounds (i) The contact and pseudo contact shifts (ii) Factors affecting nuclear relaxation (iii) NMR of metal nuclides with emphasis on ¹⁹⁵ Pt and ¹¹⁹ Sn (iv) Measurements of paramagnetic susceptibilities of coordination compounds (v) Applications for biochemical shifts

Paper-IV			
	Name of the Teacher/ College	Paper/Unit/No.of Lectures	Topic
<u>Friday: 2.00- 4.00pm.</u> Nov : 25 Dec: 2, 9, 16, 23. Jan : 6,13,20,	Dr. S.Z.Bootwala Wilson College	Paper-IV/Unit-I/ 15 Lectures	Inorganic Materials (a) Classification, manufacture and applications of (i) Inorganic fibers, and (ii) Inorganic fillers. Study of (i) Condensed phosphates, and (ii) Coordination polymers. (b) Preparation, properties and uses of industrially important chemicals – potassium permanganate, sodium thiosulphate, bleaching powder, hydrogen peroxide, potassium dichromate.
<u>Wednesday: 4.00-6.00</u> Jan : 25. Feb: 1,8, 15,22 March: 1,8,15	Dr. H.A.Parbat Wilson College	Paper-IV/Unit-II /15 Lectures	Nuclear Chemistry and Inorganic Pharmaceuticals (a) Nuclear Chemistry : Introduction to of nuclear fuels and separation of fission products from spent fuel rods by PUREX process. Super heavy element:, discovery, preparation, position in the periodic table. (b) Inorganic Pharmaceuticals : Compounds of iron, calcium and lithium, gold antiarthritic drugs, anti-cancer drugs, radiopharmaceuticals containing Tc, Ga and Xe isotopes, contrast agents for X-ray and NMR imaging.
<u>Thursday : 4.00-6.00</u> Feb: 2,9,16,23 March: 2,9,16,23	Dr. H.A.Parbat Wilson College	Paper-IV/Unit-III/ 15 Lectures	Advances in Nanomaterials: (a) Types of nanomaterials, e.g. nanotubes, nanorods, solid spheres, core-shell nanoparticles, mesoporous materials; General preparative methods for various nanomaterials. (b) Some important properties of nanomaterials: optical properties of metal and semiconductor nanoparticles, magnetic properties. (c) Some special nanomaterials: Carbon nanotubes: Types, synthesis using various methods, growth mechanism, electronic structure; Porous silicon: Preparation and mechanism of porous silicon formation, Factors affecting porous structure, properties of porous silicon; Aerogels: Types of aerogels, Properties and applications of aerogels. (d) Applications of nanomaterials in electronics, energy, automobiles, sports and toys, textile, cosmetics, medicine, space and defense. Environmental effects of nanotechnology.
<u>Monday:4.00-6.00pm</u> Nov : 21,29 Dec: 5, 12, 19. Jan : 2,9	Dr.Juleikha Shaikh Maharashtra College	Paper-IV/Unit-IV /15 Lectures	I. Isopoly and Heteropoly acids, II .Supramolecular chemistry III Inorganic pesticides, and IV Intercalation compounds

M. Sc. (PART II) (SEM. IV) INORGANIC CHEMISTRY (2016-2017)

NOTE : Attention of post-graduate students (Part-II) (Sem.IV) 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.
2nd Nov. 2016

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 Inorganic Chemistry are hereby requested to submit the attendance rolls in respect of the lectures delivered by them during the academic year 2016-2017 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 Inorganic Chemistry are hereby informed that no change will be permitted in the venue and timings of the lectures.

No.PG/2/ICD/2016-17/ 2301 of 2016.

2nd Nov., 2016.

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.

Mumbai-400 032.
2nd Nov. 2016

Sd/-
Assistant Registrar
UG/PG Section