P.S.B. GOVT.DEGREE COLLEGE,LAMBGAON B. Sc. [CHEMISTRY, PAPER I : INORGANIC CHEMISTRY (PAPER CODE : CH-301]– III Year TEACHING PLAN FOR ACADEMIC SESSION 2022-23			
COURSE TEACHER: **DURGA PRASAD**			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Credits: Maximum Marks:		**INORGANIC CHEMISTRY PAPER-I** **Six (Five for Theory and One for Tutorial)** **End-term examination:** **Internal assessment: 50**	
Course Description		This course contains basic idea of Inorganic Chemistry	
UNIT	**TOPIC**	**Number of Lectures**	**Name of the Course teacher**
UNIT I	**I.Metal-ligand bonding in Transition Metal Complexes** Limitations of valance bond theory, an elementary idea of crystal field theory	3	Durga Prasad
	crystal field splitting in octahedral, tetrahedral and square planner complexes, factors affecting the crystalfield parameters.	3	
	II. Thermodynamic and Kinetic Aspects of Metal Complexes A brief outline of thermodynamics stability of metal complexes and factors affecting the stability,	4	
	stability constants of complexes and their determination, substitution reactions of square planar complexes.	4	
UNIT II	**III.Magnetic Properties of Transition Metal Complexes** Types of magnetic behavior, methods of determining magnetic susceptibility, spin only formula,	3	Durga Prasad
	L-S coupling, correlation of μs and μeff values,orbital contribution to magnetic moments, application of magnetic moment data for 3d-metal complexes..	4	
	IV. Electronic spectra of Transition Metal Complexes Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series,	4	
	spectrochemical series,Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion.	4	
UNIT III	**V. Organometallic Chemistry** Definition, nomenclature and classification of organometallic compounds,	3	Durga Prasad
	Preparation,properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Snl.	3	

	Metal carbonyls: 18 electron rule, preparation,structure and nature of bonding in the mononuclear carbonyls.	4	
UNIT IV	**VII. Hard and Soft Acids and Bases (HSAB)** Classification of acids and bases as hard and soft, Pearson's HSAB concept,,	3	Durga Prasad
	acid-base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity and hardness and softness, Drago wayland equation, donor acceptor number.	4	
	electro negativity and hardness and softness, Drago wayland equation, donor acceptor number.	4	
UNIT V	**VIII. Bioinorganic Chemistry** Essential and trace elements in biological processes.	2	Durga Prasad
	metalloporphyrins with special reference to hemoglobin and myoglobin, cooperative effect, Biological role of alkali and alkaline earth metal ions with special reference to Ca2+	4	
	Biological role of alkali and alkaline earth metal ions with special reference to Ca2+	4	

Note1:The calculation for total number of lectures is done on the basis of 180 teaching days per Year and 6 periods. 5 for theory and 1 for tutorial] allotted for the course per week during the Year. The duration of one lecture is 45 min.

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Reference Books:

J.D Lee concise, Inorganic chemistry, E.L.V.S

- Puri, Sharma and Kaliya,Principles of inorganic ch emistry, Milestone Publisher and Distributers
- R.L. Madan, Chemistry for degree students, S. Chand & company, New Delhi
- Selected topics in Inorganic Chemistry, Malik, Tuli and Madan, S. Chand & company, New Delhi
- Satya Prakash, Modern Inorganic Chemistry, S. Chand & company, New Delhi, I.L Finar,Organic chemistry, Pearson

Counter signed [Principal] Sig. [Head] Sig. [Course teacher]

P.S.B. GOVT. DEGREE COLLEGE,LAMBGAON B. Sc. [CHEMISTRY, PAPER-II: ORGANIC CHEMISTRY] (PAPER CODE : CH-302]– III Year TEACHING PLAN FOR ACADEMIC SESSION 2022-23			
COURSE TEACHER: **DURGA PRASAD**			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Credits: Maximum Marks:		**ORGANIC CHEMISTRY PAPER-II** **Six (Five for Theory and One for Tutorial)** **End-term examination:** **Internal assessment: 50**	
Course Description		This course contains basic idea of organic chemistry	
UNIT	**TOPIC**	**Number of Lectures**	**Name of the Course teacher**
UNIT I	**I. Spectroscopy** Nuclear magnetic resonance (NMR) spectroscopy, Proton magnetic resonance (1H NMR) spectroscopy, nuclear shielding and deshielding,	2	Durga Prasad
	chemical shift and molecular structure, spin spin splitting and coupling constants, areas of signals, interpretation of 1H NMR,	2	
	spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1, 2-tribromoethane, ethyl acetate, toluene and acetophenone	2	
	Problems pertaining to the structures elucidation of simple organic compounds using UV, IR and 1H NMR spectroscopic, techniques..	2	
UNIT II	**II. Organometallic Compounds** Organomagnesium compounds: the Grignard reagents, formation, structure and chemical reactions.	2	Durga Prasad
	Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions.	3	
	III. Organosulphur Compounds Nomenclature, structural formation, methods of formation and chemical reactions of thiols,	2	
	thioethers, sulphonic acids, sulphonamides and Sulphaguanidine..	2	
	IV. Hetrocyclic Compounds Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan,thiophene and pyridine,	2	
	Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution,Mechanism of nucleophilic substitution reaction in pyridine derivatives, Comparison of basicity of pyridine, piperidine and pyrrole.	3	

	Introduction to condensed five and six membered heterocycles, Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis,	2	
	Skraup synthesis and Bischler-Nepieralski synthesis, Mechanism of electrophilc substitution reactions of indole, quinoline and isoquinoline.	2	
UNIT III	**V. Carbohydrates** Classification and nomenclature, Monosaccharides, mechanism of osazone formation,interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.	3	Durga Prasad
	Configuration of monosaccharides, Erythro and threo diastereomers, Conversion of glucose intro mannose, Formation of glycosides, ethers and esters, Determination of ring size of monosaccharides, Cyclic structure of D(+)-glucose, Mechanism of mutarotation. Structures of ribose and deoxyribose	2	
	An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides(starch and cellulose) without involving structure determination.	2	
	VI. Amino Acids, Peptides, Proteins and Nucleic Acids: Classification, structure and stereochemistry of amino acids, Acid-base behavior isoelectric point and electrophoresis, Preparation and reactions of O-amino acids,	2	
	Structure and nomenclature of peptides and proteins,Classification of proteins, peptide structure determination, end group analysis, selective hydrolysis of peptides, classical peptide synthesis, solid-phase peptide synthesis.	3	
	Structures of peptides and proteins, Levels of protein structure, Protein denaturation/ renaturation; Nucleic acids : Introduction, constituents of nucleic acids, Ribonucleosides and ribonucleotides, The double helical structure of DNA.	3	
UNIT IV	**VII. Fats, Oils and Detergents** Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides,hydrogenation of unsaturated oils,	3	Durga Prasad
	Saponification value, iodine value, acid value, Soaps, synthetic detergents, alkyl and aryl sulphonates.	2	
	VIII. Synthetic Polymers Addition or chain-growth polymerization, Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers,	3	
	Condensation or step growth-polymerization, Polyesters, plyamides, phenol formaldehyde resins, urea formaldehyde resins, epoxy resins and polyurethanes, Natural and synthetic rubbers, Elementary idea of organic conducting polymers.,	3	
	IX. Synthetic Dyes Colour and constitution (electronic Concept), Classification of dyes, Chemistry and synthesis of Methyl orange, Congo red, Malachite green, crystal violet, phenolphthalein, fluorescein,	2	

	Alizarin and Indigo.		
UNIT V	**X. Organic Synthesis via Enolates** Acidity of O-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate,	2	Durga Prasad
	Synthesis of ethyl acetoacetate: the Claisen condensation, Keto-enol tautomerism of ethylacetoacetate.	2	
	Alkylation of 1, 3-dithianes, Alkylation and acylation of enamines.	2	

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Reference Books:

- E.L. Eliel, Stereochemistry of organic compounds, Willey.
- Morrison and Boyd, Organic chemistry, Prentice-Hall, New Delhi.
- S.M. Mukherji and Singh. Reaction mechanism in organic chemistry, Macmillan, Reprint
- Elementary Spectroscopy, Y.R. Sharma, S. Chand
- G. Marc Loudon, Organic Chemistry, Oxford University Press (Replica Press), Kundali, Haryana.

Counter signed [Principal] Sig. [Head] Sig. [Course teacher]

P.S.B. GOVT.DEGREE COLLEGE,LAMBGAON B. Sc. [CHEMISTRY, PAPER III : PHYSICAL CHEMISTRY (PAPER CODE : CH-303]– III Year TEACHING PLAN FOR ACADEMIC SESSION 2022-23			
COURSE TEACHER: **DURGA PRASAD**			
COURSE TITLE AND OTHERS PECIFICATION			
Course Title: Course No.: Credits: Maximum Marks:		**PHYSICAL CHEMISTRY PAPER-III** **Six (Five for Theory and One for Tutorial)** **End-term examination:** **Internal assessment: 50**	
Course Description		This course contains basic idea of Physical Chemistry	
UNIT	**TOPIC**	**Number of Lectures**	**Name of the Course teacher**
UNIT I	**I. Introducton:** Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids,	2	Durga Prasad
	Bohr's model of hydrogen atom (without derivation) their solution of overall solution and its defects,.	2	
	Compton effect, de-Broglie's hypothesis, the Heisenberg's uncertainty principle,Hamiltonian Operator.	2	
	II. Elementary Quantum Mechanics: Schrödinger wave equation and its importance, physical interpretation of the wave function,postulates of quantum mechanics, particle in a one dimensional box.	3	
	Schrödinger wave equation for H-atom, separation into three equations (without derivation), quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.	3	
	Molecular orbital theory, basic ideas – criteria for forming M.O. from A.O., construction of M.O's by LCAO – H2+ ion, calculation of energy levels from wavefunctions,	3	
	physical picture of bonding and anti-bonding wave functions, concept of(σ,σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals – sp, sp2, sp3,	2	
	calculation of coefficients of A.O's used in sp and sp2 hybrid orbitals and interpretation of geometry. Introduction to valence bond model of H2, comparison of M.O. and V.B. models	2	

UNIT II	**III. Physical Properties and Molecular Structure:** Optical activity, polarization – (Clausius – Mossotti equation), orientation of dipoles in an electric field, dipole moment, induced dipole moment,.	3	Durga Prasad
	measurement of dipole moment temperature method and refractivity method, dipole moment and structure of molecules,	2	
	magnetic properties-paramagnetism, diamagnetism and ferromagnetic, Magnetic susceptibility, its measurements and its importance.	2	
UNIT III	**IV. Spectroscopy**: *Introduction:* Electromagnetic radiation, regions of the spectrum, basic features of different spectrophotometers, statement of the born-oppenheimer approximation, degrees of freedom.	3	Durga Prasad
	Rotational Spectrum: Diatomic Molecules: Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect.	3	
	Vibrational Spectrum: Infrared Spectrum: Energy levels of simple harmonic oscillator,selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups.	3	
	Raman Spectrum: Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules.	2	
	Electronic Spectrum: Concept of potential energy curves for bonding and anti-bonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ, π and T M.O. their energy levels and the respective transition.	3	
UNIT IV	**V. Photochemistry:** Interaction of radiation with matter, difference between thermal and photochemical processes,	2	Durga Prasad
	Laws of photochemistry: Grothus – Drapper law, Star Einstein law, Jablonski diagram depicting various processes occurring in the excited state,	3	
	qualitative description of fluorescence, phosphorescence, non- radiative processes (internal conversion, intersystem crossing),	2	
	quantum yield, photosensitized reactions – energy transfer processes (simple examples), Kinetics of Photo chemical reaction.	2	

UNIT V	**VI. Solutions, Dilute Solutions and Colligative Properties:** Ideal and non-ideal solutions, methods of expressing concentrations of solutions, activity and activity coefficient. Dilute solution,	3	Durga Prasad
	colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, laws of osmotic pressure, its measurement and determination of molecular weight from osmotic pressure.	3	
	Elevation of boiling point and depression of freezing, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point.	3	
	Experimental methods for determining various colligative properties.Abnormal molar mass, Van't Hoff factor, Colligative properties of degree of dissociation and association of solutes	2	

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Reference Books:

- Atkins P.W. Physical Chemistry, Oxford University Press
- Bell D.W. Physical Chemistry, Thomson Press
- R.L. Madan, Chemistry for degree students, S. Chand & company, New Delhi
- Puri and Sharma and Pathaniya, Principles of Physical Chemistry, Milestone Publisher and Distributors, New Delhi
- Behl and Tuli, Essential of Physical Chemistry, S. Chand & Company, New Delhi

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