P.S.B. DEGREECOLLEGE,LAMBGAON

B. Sc. [CHEMISTRY, PAPER I : INORGANIC CHEMISTRY (PAPER CODE : CH-201]– II Year

TEACHING PLAN FOR ACADEMIC SESSION 2021-22

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. Chemistry of elements of First Transition Series** Characteristic properties of d-block elements.	3	Durga Prasad
	Binary compounds (hydrides, carbides and oxides) of the elements of the first transition series and	2	
	complexes with respect to relative stability of their oxidation states, coordination number and geometry.	2	
	II. Chemistry of elements of Second and Third Transition Series General characteristics,	2	
	Comparative treatment of Zr/Hf, Nb/Ta, Mo/W in respect of ionic radii, oxidation states.	3	
	magnetic behavior, spectral properties and stereochemistry	3	
UNIT II	**III. Coordination Compounds** Werner's coordination theory and its experimental verification, effective atomic number concept	4	Durga Prasad
	Chelates, nomenclature of coordination compounds,	3	
	isomerism in coordination compounds, valence bond theory of transition metal complexes.	3	
UNIT III	**IV. Chemistry of Lanthanide Elements** Electronic structure, oxidation states and ionic radii and lanthanide contraction	4	Durga Prasad
	Complex formation, occurrence and isolation, ceric ammonium sulphate and its analytical uses	4	
	V. Chemistry of Actinides Electronic configuration, oxidation states and magnetic properties	3	
UNIT IV	**VI. Oxidation and Reduction** Electrode potential, electrochemical series and its applications	4	Durga Prasad
	Principles involved in the extraction of the elements.	4	

UNIT V	**VII. Acids and Bases** Arrhenius, Bronsted-Lowry, the Lux-Flood	4	Durga Prasad
	Solvent system and Lewis concept of acids and bases	4	
	VIII. Non-aqueous Solvents Physical properties of a solvent, types of solvents and their general characteristics	4	
	Reactions in non- aqueous solvents with reference to liquid NH3 and liquid SO2	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.

**The distribution of maximum marks for internal assessment will be according to the rules of the University.*

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. DEGREECOLLEGE,LAMBGAON B. Sc. [CHEMISTRY, PAPER-II: ORGANIC CHEMISTRY] (PAPER CODE : CH-202]– II Year TEACHING PLAN FOR ACADEMIC SESSION 2021-22			
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.Electromagnetic Spectrum Absorption Spectra** **Ultraviolet (UV) absorption spectroscopy** – absorption laws (Beer-Lambert law), molar absorptivity presentation and analysis of UV spectra	3	Durga prasad
	types of electronic transitions, effect ofconjugation. Concept of chromophore and auxochrome, Bathochromic hypsochromic,hyperchromic and hypochromic shifts. U.V. spectra of conjugated enes and enones	3	
	Infrared (I.R.) absorption spectroscopy – molecular vibrations, Hooke's law, selection rules,intensity andposition of I.R. bands,	2	
	measurement of I.R. spectrum, finger print region, characteristic absorptions of various functional groups and interpretation of I.R. spectra of simple organic compounds.	3	
UNIT II	**II. Alcohols** Classification and nomenclature, Monohydric alcohols – nomenclature, methods of formation by reduction of Aldehydes, Ketones, Carboxylic acids and Esters, Hydrogen bonding, Acidic nature, Reactions of alcohols.	3	Durga Prasad
	Dihydric alcohols - – nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4] and pinacol- pinacolone rearrangement.Trihydric alcohols - nomenclature, methods of formation, chemical reactions of glycerol	3	
	III. Phenols : Nomenclature, structure and bonding, preparation of phenols, physical properties and acidic character,	2	
	Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion.	2	
	Reactions of phenols – electrophilic aromatic substitution, acylation and carboxylation.	2	

	Mechanisms of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Hauben-Hoesch reaction, Lederer Manasse reaction and Reimer-Tiemann reaction.	2	
UNIT III	**IV. Ethers and Epoxides** Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions – cleavage and autoxidation, Ziesel's method.	2	Durga Prasad
	Synthesis of epoxides, Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organo lithium reagents with epoxides.	3	
	V. Aldehydes and Ketones: Nomenclature and structure of the carbonyl groups, synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides,	2	
	synthesis of aldehydes and ketones uses 1, 3-dithianes, synthesis of ketones from nitrites and from carboxylic acids, Physical properties.	2	
	Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations, Condensation with ammonia and its derivatives. Wittig reaction, Mannich reaction.	3	
	Use of acetals as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of Ketones,	2	
	Cannizzaro reaction, MPV, Clemmensen, Wolff-Kishner, LiAlH4 and NaBH4 reductions. Halogenation of enolizable ketones, An introduction to O, P unsaturated aldehydes and Ketones	3	
UNIT IV	**VI. Carboxylic Acids:** Nomenclature, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength, Preparation of carboxylic acids,	2	Durga Prasad
	Reactions of carboxylicacids, Hell-Volhard-Zelinsky reaction, Synthesis of acid chlorides, esters and amides,Reduction of carboxylic acids, Mechanism of decarboxylation. Methods of formation and chemical reactions of halo acids,	3	
	Hydroxy acids: malic, trartaric and citric acids. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: methods of formation and effect of heat and dehydrating agents.	3	
	VII. Carboxylic Acid Derivatives Structure and nomenclature of acid chlorides, esters, amides (urea) and acidanyhydrides. Relative stability of acyl derivatives, Physical properties,	2	
	interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic acid derivatives, chemical reaction. Mechanisms of esterificaton and hydrolysis (acidic and basic)	2	

UNIT V	**VIII. Organic Compounds of Nitrogen:** Preparation of nitroalkanes and nitroarenes, Chemical reactions of nitroalkanes. Mechanisms of nuclephilc substitution in nitroarenes and their reductions in acidic, neutral and alkaline media, Picric acid.	2	Durga Prasad
	Halonitroarenes: reactivity, Structure and nomenclature of amines, physical properties, Stereochemistry of amines, Separation of a mixture of primary, secondary and tertiary amines. Structural features effecting basicity of amines. Amine salts as phase-transfer catalysts,	2	
	Preparation of alkyl and aryl amines (reduction of nitro compounds, nitrities),reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction, Hofmann-bromamide reaction. Reactions of amines, electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.Synthetic transformations of aryldiazonium salts, azo coupling.	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.

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P.S.B. DEGREECOLLEGE,LAMBGAON B. Sc. [CHEMISTRY, PAPER III : PHYSICAL CHEMISTRY (PAPER CODE : CH-203]– III Year TEACHING PLAN FOR ACADEMIC SESSION 2021-22			
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: Thermodynamics – I** Definitions of thermodynamic terms: System, surroundings etc. types of systems, intensive and extensive properties, State and path functions and their differentials,Thermodynamic processes, concept of heat and work.	2	Durga Prasad
	First Law of Thermodynamics: Statement, definition of internal energy and enthalpy, Heat capacity, heat capacities at constant volume and pressure and their relationship, Joule's law Joule-Thomson coefficient and inversion temperature.	2	
	Calculation of w, q, δU & δH for the expansion of ideal gases under isotheral and adiabatic conditions for reversible process.	2	
	Thermochemistry: Standard state, standard enthalpy of formation – Hess's Law of heat summation and its applications Heat of reaction at constant pressure and at constant volume,	2	
	Enthalpy of neutralization, Bond dissociation energy and its calculation from thermochemical data, temperature dependence of enthalpy, Kirchhoff's equation	2	

UNIT II	**II. Thermodynamics – II** Second Law of Thermodynamics: Need for the law, different statements of the law, Cornot's cycle and its efficiency, Carnot's theorem. Thermodynamic scale of temperature.	2	Durga Prasad
	Concept of entropy: Entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change,	3	
	clausius inequality, entropy as a criteria of spontaneity and equilibrium, Equilibrium change in ideal gases and mixing of gases.	2	
	Gibbs and Helmholtz functions: Gibbs function (G) and Helmhotz function (A)as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity,their advantage over entropy change, Variation of G and A with P, V and T.	3	
	Third Law of Thermodynamics: Nernst heat theorem, statement and concept of residual entropy. Nernst distribution law thermodynamic derivation, applications.	2	
UNIT III	**III. Chemical Equilibrium** Equilibrium constant and free energy, Thermodynamic derivation of law of mass action, Le Chatelier's principle.	2	Durga Prasad
	Reaction isotherm and reaction isochore –Clapeyron-clausius equation and its applications.	2	
UNIT IV	**IV. Electrochemistry – I:** Electrical transport: Conduction in metals and in electrolyte solutions, specific conductance molar and equivalent conductance,measurement of equivalent conductance, variation of molar equivalent & specific conductance with dilution.	3	Durga Prasad
	Migration of ions and Kohlrausch's law, Arrhenius theory of electrolyte dissociation and its limitations, weak and strong electrolytes, Ostwald's dilution law its uses and limitations,	2	
	Debye-Huckel-Onsager's equation for strong electrolytes(elementary treatment only), Transport number, definition and determination by Hittorf's method and moving boundary method..	2	
	Applications of conductivity measurements: determination of degree of dissociation, determination of Ka of acids, determination of solubility product of a sparingly soluble salt, conductometric titrations..	3	
	V. Solutions: Liquid – Liquid mixtures- Ideal liquid mixtures, Raoult's and Henry's law, Non-ideal systemazeotropes– HCl-H2O and ethanol – water systems	3	
	Partially miscible liquids- Phenol – water, trimethylamine – water, nicotine-water systems, Immiscible liquids, steam distillation	2	

UNIT V	**VI. Electrochemistry – II:** Types of reversible electrodes – gas-metal ion, metal-ion, metal-insoluble salt anion and redox electrodes, Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential,	2	Durga Prasad
	strandard hydrogen electrode-reference electrodes and their applications,standard electrode potential, sign conventions, electrochemical series and its significance.	2	
	Electrolytic and Galvanic cells–reversible and irreversible cells, conventional representation of electrochemical cells, EMF of a cell and its measurements,	2	
	Computation of cell EMF,Calculation of thermodynamic quantities of cell reactions (QG, QH and K) Concentration cell with and without transport,	2	
	liquid junction potential, application of concentration cells,valency of ions, solubility product and activity coefficient, potentiometric titrations.	2	
	Definition of pH and pKa, determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods, Buffers – Mechanism of buffer action, Henderson-Hazel equation, application of buffer solution, Hydrolysis of salts	3	
	VII. Phase Equilibrium: Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibb's phase rule, phase equilibria of one component system-water, 'CO2' and 'S' systems	2	
	Phase equilibria of two component system – solid liquid equilibria simple eutectic – Bi-Cd, Pb-Ag systems, desilverisation of lead.	2	
	Solid solutions – compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (FeCl3-H2O) and (CuSO4-H2O) system	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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