GOVT POST GRADUATE COLLEGE NALAGARH, SOLAN, HP

DEPARTMENT OF BOTANY
BSc Botany Teaching Plan (Annual Pattern)

BSc First Year

Biodiversity (Microbes, Algae, Fungi, and Archegoniates) - BOTA 101

Theory Lectures: 60
Practical: 20 marks
Key Topics and Teaching Methods:

Unit	Topics	Lectures	Teaching Method
1	Microbes: Viruses, Bacteria, Reproduction, Economic Importance	7	Blackboard, PPT, and Video for microbial life cycles
2	Algae: Classification, Morphology, Life-cycles, Economic Importance	12	PPT, Video lectures, Practical on microscope observations, Field visit to observe algae
3	Fungi: Characteristics, Life Cycles of Phytophthora, Rhizopus, Penicillium, etc.	12	Blackboard, PPT, Practical on culturing techniques
4	Bryophytes: Morphology, Reproduction, Economic Importance	9	PPT, Video, Practical for observing structures, Field visit
5	Pteridophytes: Classification, Morphology, Stelar Evolution	10	Blackboard, PPT, Practical, Field visit
6	Gymnosperms: Morphology, Anatomy, Economic Importance	10	PPT, Practical on cones and seeds, Field visit to botanical garden

Practicals:
- Gram staining, culturing of microbes
- Study of algae and fungi under microscope
- Observation of Gymnosperm structures
- Field visits to local natural habitats to observe algae, bryophytes, and pteridophytes

Plant Ecology and Taxonomy - BOTA 102

Theory Lectures: 60
Practical: 20 marks
Key Topics and Teaching Methods:

Unit	Topics	Lectures	Teaching Method
1	Ecological Factors: Soil, Water, Light, and Temperature	13	Blackboard, Video lecture, Field study on soil and water
2	Plant Communities: Ecotone, Succession	5	PPT, Practical on community survey
3	Ecosystem: Structure, Trophic Levels, Biogeochemical Cycling	10	Blackboard, PPT, Field visit for ecosystem study
4	Plant Taxonomy: Identification, Classification, Nomenclature	3	Blackboard, Practical on specimen identification
5	Taxonomic Tools: Herbarium, Botanical Gardens	8	Practical on herbarium preparation, Field visit to botanical garden
6	Biometrics, Numerical Taxonomy, and Cladistics	3	Blackboard, PPT, practical exercises on data analysis

Practicals:
- Soil analysis, pH measurement, infiltration tests
- Quadrat analysis for vegetation
- Identification of plant families and specimen mounting
- Field visits for studying plant communities and ecological interactions

BSc Second Year

Plant Anatomy and Embryology - BOTA 201
Theory Lectures: 60
Practical: 20 marks
Key Topics and Teaching Methods:

Unit	Topics	Lectures	Teaching Method
1	Meristematic and Permanent Tissues	7	Blackboard, PPT, Practical on tissue types
2	Organ Anatomy: Root, Stem, Leaf Structures	7	PPT, Video, Practical on sectioning
3	Secondary Growth in Plants	8	Blackboard, Practical, PPT on wood anatomy
4	Flower Structure, Anther, Ovule, Embryo Sac	13	Blackboard, PPT, Practical on dissection and slides
5	Pollination and Fertilization	4	Video, Practical on pollination mechanisms
6	Embryo and Endosperm	6	Blackboard, PPT, Practical on seed structures

Practicals:
- Sectioning and staining of plant tissues
- Dissection of flowers and observation of reproductive structures
- Observation of embryo and seed development stages

Plant Physiology and Metabolism - BOTA 202

Theory Lectures: 60

Practical: 20 marks

Key Topics and Teaching Methods:

Unit	Topics	Lectures	Teaching Method
1	Plant-Water Relations, Transpiration	8	Blackboard, Practical on transpiration and stomatal index
2	Mineral Nutrition, Ion Transport	8	PPT, Video, Practical on nutrient analysis
3	Phloem Translocation and Photosynthesis	16	Video, Practical on chromatography and O_2 evolution
4	Respiration and Enzyme Activity	8	Blackboard, PPT, Practical on enzyme assays
5	Nitrogen Metabolism	4	Video, Practical on nitrogen fixation
6	Plant Growth Regulators	6	PPT, Practical on auxin and cytokinin effects
7	Light and Temperature Responses	6	Blackboard, PPT, and video demonstration

Practicals:
- Experiments on transpiration, photosynthesis, respiration
- Chromatography for pigment separation
- Enzyme activity assays and auxin effect on root growth

BSc Third Year

Economic Botany and Biotechnology - BOTA 301

Theory Lectures: 60

Practical: 20 marks

Key Topics and Teaching Methods:

Unit	Topics	Lectures	Teaching Method
1	Cultivated Plants, Cereals, Pulses, and Spices	15	Blackboard, PPT, Field visit to agriculture research centers
2	Beverages, Oils, and Medicinal Plants	12	PPT, Video on processing, Field visit
3	Introduction to Biotechnology	15	Video, Practical on tissue culture techniques
4	Gene Transfer, Transgenic Plants	18	Blackboard, PPT, Video on biotechnological applications

Practicals:
- Study of economically important plants
- Tissue culture lab techniques

- Observation of molecular techniques through videos

Cell and Molecular Biology - BOTA 303

- **Credits**: Theory-4, Practicals-2
- **Total Theory Lectures**: 60
- **Key Topics and Teaching Methods**

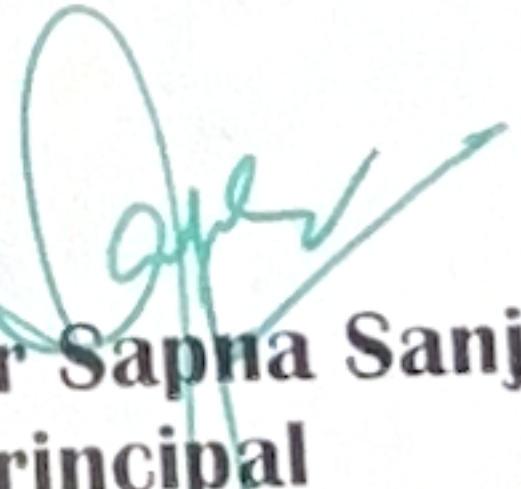| Section	Unit	Topics	Lectures	Teaching Method
Section A	Unit 1	Techniques in Biology: Principles of microscopy, Light and Phase contrast microscopy, Fluorescence microscopy, Electron microscopy (EM, STEM), Sample preparation, X-ray diffraction analysis	8	PPT, Video demonstrations of microscopy techniques, Practical demonstration of basic microscopy
	Unit 2	Cell as a Unit of Life: Cell Theory, Prokaryotic and eukaryotic cells, Cell size and shape, Eukaryotic cell components	2	Blackboard for cell theory, PPT for cell structure comparison
	Unit 3	Cell Organelles: Mitochondria (structure, composition, DNA), Chloroplast (structure, chloroplast DNA), Symbiont hypothesis	20	PPT, Video on organelle functions, Practical observation of organelles under a microscope, Video on endosymbiotic theory
Section B	Unit 4	**ER, Golgi Body, Lysosomes, Peroxisomes, Glyoxisomes, Nucleus**: Nuclear envelope, chromatin structure, euchromatin, heterochromatin, nucleolus, ribosomes	8	Blackboard, PPT, Practical on cell organelle staining
	Unit 5	**Cell Membrane and Cell Wall**: Membrane structure, fluidity, proteins, carbohydrates, selective permeability, cell wall	6	Blackboard for structure, PPT and Video for membrane models, Practical on semi-permeable membrane
Section C	Unit 6	**Cell Cycle**: Mitosis, Meiosis, Molecular controls	6	Blackboard, Video on mitosis and meiosis, Practical demonstration using temporary mounts and permanent slides
	Unit 7	**Genetic Material**: DNA structure, replication (prokaryotes and eukaryotes), Griffith's and Avery's experiments, Hershey-Chase experiment	6	PPT for DNA structure and replication models, Video for historical experiments, Practicals on DNA visualization
Section D	Unit 8	**Transcription and Translation**: RNA types (mRNA, tRNA, rRNA), RNA polymerase, genetic code	6	PPT, video on transcription and translation processes, Blackboard explanation of genetic code
	Unit 9	**Regulation of Gene Expression**: Prokaryotes (Lac and Tryptophan operon), Eukaryotic gene regulation	6	Blackboard, video on operon models, PPT for gene regulation in eukaryotes

Practicals

- Study of prokaryotic cells (bacteria), viruses, and eukaryotic cells using micrographs
- Observation of cell organelles using photomicrographs
- Plant cell structure via temporary mounts
- Study of mitosis and meiosis (temporary mounts and permanent slides)
- Effect of temperature and solvents on a semi-permeable membrane
- Demonstration of dialysis of starch and simple sugar
- Plasmolysis and deplasmolysis in Rhoeo leaf
- Measuring cell size using micrometry
- Structure of nuclear pore complex
- Special chromosomes (polytene & lampbrush) observation via slides/photographs
- DNA packaging study through micrographs
- Karyotype and ideogram preparation from metaphase chromosome photographs

Skill Enhancement Courses

1. **Biofertilizers (BOTA 203)**:
   - **Lectures**: 45, focusing on microbial inoculants, mycorrhiza, and organic farming.
   - **Method**: Blackboard, practical on isolation of microbes, video on biofertilizer production.
2. **Gardening and Floriculture (BOTA 204)**:
   - **Lectures**: 45, covering garden design, propagation, and ornamental plants.
   - **Method**: Blackboard, PPT, field visits to nurseries, and practicals on plant propagation.
3. **Medicinal Botany and Ethnobotany (BOTA 306)**:
   - **Lectures**: 45, with an emphasis on ethnobotanical studies, medicinal plants, and conservation.
   - **Method**: Field visits, video lectures, Blackboard, and PPT.
4. **Mushroom Cultivation Technology (BOTA 307)**:
   - **Lectures**: 45, covering cultivation techniques, storage, and economic aspects.
   - **Method**: Practical on cultivation, field visit to mushroom farms, and video demonstrations.

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Tentative teaching plan

Department of Chemistry (2023-24)

BSc 1 year

Prof. Anita

Methodology- Lecture-Cum-Demonstration (Using LabI+LabII)

CHEM 101 (ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS)

July

Atomic Structure

*Review of Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation,

*Heisenberg Uncertainty principle. Hydrogen atom spectra. Significance of ψ and $\psi2$.

*Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals.

*Significance of quantum numbers, Shapes of s, p and d atomic orbitals, nodal planes. Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy.

*Slater's rule and its applications.

*Revision

*Oral test

*Written test

* Discussion on the problems

August

Recapitulation ..

*Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds.

* Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

*Covalent bonding- VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

*Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals,

*MO treatment of homonuclear diatomic molecules up to Ne (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and NO+. Comparison of VB and MO approaches.

*Revision

*Oral test

*Written test

* Discussion on the problems

September

*Recapitulation

*Fundamentals of Organic Chemistry- Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.

*Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.

*Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.

*Revision

*Oral test

*Written test

* Discussion on the problems

October

*Stereochemistry- Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer projections.

*Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; cis - trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

*Revision

*Oral test

*Written test

* Discussion on the problems

November

*Recapitulation

*Aliphatic Hydrocarbons- Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

*Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.

*Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.

*Revision

*Oral test

*Written test

* Discussion on the problems

December

*Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides.

*Reactions: Formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alkaline $KMnO_4$.

*Revision

*Oral test

*Written test

* Discussion on the problems

February and March

*Revision and discussion of all the important topics.

*Oral test

*Written test

* Discussion on the problems

Tentative Teaching Plan

B.Sc 1

LAB COURSE CHEM 101 PR

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

August

Inorganic Chemistry - Volumetric Analysis - Introduction

Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.

* Revision
*Viva-Voce
*Note-books

September

Estimation of oxalic acid by titrating it with $KMnO_4$.

* Revision

*Viva-Voce

*Note-books

October

Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$.

* Revision

*Viva-Voce

*Note-books

November

Estimation of Fe (II) ions by titrating it with K2Cr2O7 using internal indicator.

Estimation of Cu (II) ions iodometrically using Na2S2O3.

* Revision

*Viva-Voce

*Note-books

December

II. Organic Chemistry 1. Purification of organic compounds by crystallization (from water and alcohol) and distillation.

* Revision

*Viva-Voce

*Note-books

February

Separation of mixtures by Chromatography: Measure of Rf value of a mixture of two organic compounds.

* Revision

*Viva-Voce

*Note-books

Tentative teaching plan

Department of Chemistry (2023-24)

BSc 1 year

CHEM 102TH

Prof. Anita

Methodology- Lecture-Cum-Demonstration (Using LabI+LabII)

July

*STATES OF MATTER ,CHEMICAL KINETICS & FUNCTIONAL ORGANIC CHEMISTRY - A Kinetic Theory of Gases Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation.

*Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature . Critical phenomena, critical constants and their calculation from van der Waals equation. Andrews isotherms of CO_2. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies and their importance.

*Revision

*Oral test

*Written test

* Discussion on the problems

August

*Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation).

* Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. Viscosity of gases and effect of temperature and

pressure on coefficient of viscosity (qualitative treatment only). Liquids - Surface tension and its determination using stalagmometer.

*Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid.

*Revision

*Oral test

*Written test

* Discussion on the problems

September

*Solids - Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X– Ray diffraction by crystals, Bragg's law.

* Structures of NaCl, KCl and CsCl (qualitative treatment only). Defects in crystals.

*Chemical Kinetics The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction.

*Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.

*Revision

*Oral test

*Written test

* Discussion on the problems

October

*Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

* Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure.

*Aromatic hydrocarbons Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).

*Revision

*Oral test

*Written test

* Discussion on the problems

November

*Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation, Williamson's ether synthesis.

* Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent.

*Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

*Alcohols: Preparation: Preparation of primary, secondary and tertiary alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO4, acidic dichromate, conc. HNO3). Oppeneauer

oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.

*Revision

*Oral test

*Written test

* Discussion on the problems

December

*Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer - Tiemann Reaction, Gattermann-Koch Reaction, *Houben–Hoesch Condensation, Schotten – Baumann Reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI.

*Revision

*Oral test

*Written test

* Discussion on the problems

February

* Aldehydes and ketones (aliphatic and aromatic): (Formaldehye, acetaldehyde, acetone and benzaldehyde) Preparation: From acid chlorides and from nitriles. Reactions: Reaction with HCN, ROH, NaHSO3, NH2-G derivatives. Iodoform test.

*Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.

*Revision

*Oral test

*Written test

* Discussion on the problems

March

Revision and discussion of all the important topics.

Tentative Teaching Plan

B.Sc 1

LAB COURSE CHEM 102 PR STATES OF MATTER, CHEMICAL KINETICS & FUNCTIONAL ORGANIC CHEMISTRY LAB

August

Physical Chemistry Practicals

*Surface tension measurement. a) Determination of the surface tension of a liquid or a dilute solution using a stalagmometer. b) Study of the variation of surface tension of a detergent solution with concentration.

* Revision

*Viva-Voce

*Note-books

September

*Viscosity measurement a) Determination of the relative and absolute viscosity of a liquid or dilute solution using an Ostwald's viscometer. b) Study of the variation of viscosity of an aqueous solution with concentration of solute.

* Revision

*Viva-Voce

*Note-books

October

*Chemical Kinetics Study the kinetics of the following reaction: i). Acid hydrolysis of methyl acetate with hydrochloric acid. ii). Saponification of ethyl acetate. iii). Compare the strengths of HCl and H_2SO_4 by studying kinetics of hydrolysis of methyl acetate II

* Revision

*Viva-Voce

*Note-books

November-December

*Organic Chemistry - Systematic Qualitative Organic Analysis of Organic Compounds possessing monofunctional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines)

* Revision

*Viva-Voce

*Note-books

February

*Preparation of one derivative and melting point determinaton.

* Revision

*Viva-Voce

*Note-books

1) Anita (Anu)

Department of Chemistry

Tentative Lesson Teaching Plan

B.Sc II Year

Title: SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & ORGANIC CHEMISTRY

Course Code: CHEM 201TH

Dr. Chandresh Kumari

Section	Topic	Details	Month	Remarks
D	**Carbohydrates**	Classification and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharide. Structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.	**July - August**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics
C	**1. Carboxylic acids (aliphatic and aromatic) 2. Carboxylic**	Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Carboxylic	**September -October**	Each topic will be explained by conventional method

| | acid derivatives (aliphatic)
3. **Amines and Diazonium Salts** | acids (aliphatic and aromatic) - Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Hell – Vohlard - Zelinsky Reaction. Carboxylic acid derivatives (aliphatic): (Upto 5 carbons) - Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their inter conversion. Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation. Amines and Diazonium Salts Amines (Aliphatic and Aromatic): (Upto 5 carbons - Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction. Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, reaction with HNO_2, Schotten – Baumann Reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation. Diazonium salts: Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes. | | (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics |

| C | 1. Conductance 2. Electrochemistry | Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid base). Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance. Types of electrodes. Standard electrode potential. Electrochemical series. Thermodynamics of a reversible cell, calculation of thermodynamic properties: ΔG, ΔH and ΔS from EMF data. | November-December | Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics |

		Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, $NaCl-H_2O$ and $Mg-Zn$ only).		

Note: Practical Classes will be held simultaneously at the end of each topic. Class test after each section and Mid Term test will be taken during the Session

Department of Chemistry

Tentative Lesson Teaching Plan

B.Sc IInd Year

Title: Chemistry of Main Group Elements, Chemical Energetics & Equilibria

Course Code: CHEM 202TH

Dr. Kumari Bandna

Section	Topic	Details	Month	Remarks
A	1. **Hydrogen** 2. **S-Block Elements**	Hydrogen Unique position of Hydrogen in the periodic table, isotopes, ortho and para hydrogen, Industrial production, Hydrides and their chemistry, Heavy water, Hydrogen bonding, Hydrates. S-Block Elements Periodicity of elements	July - August	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will

		Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge. pH determination using hydrogen electrode and quinhydrone electrode.		
A	1. Solutions 2. Phase Equilibrium	Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Lever rule. Azeotropes. Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Nernst distribution law and its applications, solvent extraction. Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation. Derivation of Clausius – Clapeyron equation and its importance in phase equilibria.	**February-March**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

		with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling Scale). General characteristics of s-block elements like density, melting points, flame colouration and reducing character, salvation and complexation tendencies and solutions of metals in liquid ammonia		be given to students related to topics
B	1. **P- Block Elements** 2. **Noble Gases**	P- Block Elements Comparative studies including diagonal relationship of group 13 and 14 elements. Borohydrides, Hydrides, oxide and oxy-acids and halides of boron, borax, Borazine ,allotropic forms of carbon, fullerenes, carbides of calcium and silicon. Hydrides, oxides, oxoacids and halides of nitrogen. Allotropic forms of phosphorous. Hydrides, halides, oxides and oxyacids of phosphorous. Basic properties of halogens and inter halogen compounds, pseudohalogens and poly halides Noble Gases Occurrence of noble gases, History of discovery of noble gases and isolation of noble	**September -October**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics

		gases form air. Preparation properties and structure of important compounds of noble gases-flourides, oxides, oxyflorides of xenon (valence bond structure only). Krypton difloride and clathrate compounds of noble gases.		
C	1. Chemical Energetics	Chemical Energetics: Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.	November-December	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
D	1. Chemical Equilibrium 2. Ionic Equilibrium	Chemical Equilibrium: Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG	February-March	Each topic will be explained by conventional method (Chalk and board) and power point

		and ΔG^0, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases. Ionic Equilibria: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle		presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Practical Classes will be held Simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

Dr. Kumari Bandna

Tentative Lesson Teaching Plan

B.Sc II Year

Title: BASIC ANALYTICAL CHEMISTRY

Course Code: CHEM 203

Dr. Chandresh

Section	Topic	Details	Month	Remarks
A	3. **Introduction** 4. **Analysis of soil**	Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures. Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators. a. Determination of pH of soil samples. b. Estimation of Calcium and Magnesium ions as Calcium carbonate by	**July - August**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

C	**Chromatography**	complexometric titration. Definition, general introduction on principles of chromatography, paper chromatography, TLC etc. a. Paper chromatographic separation of mixture of metal ion (Fe^{3+} and Al^{3+}). b. To compare paint samples by TLC method. Ion-exchange: Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).	**September -October**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
B	1. **Analysis of water** 2. **Analysis of food products**	Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. a. Determination of pH, acidity and alkalinity of a water sample. b. Determination of dissolved oxygen (DO) of a water sample. Nutritional value of foods, idea about food processing and food preservations and adulteration. a. Identification of adulterants in some common food items like	**November-December**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

		coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc. b. Analysis of preservatives and colouring matter.		
D	1. **Analysis of cosmetics** 2. **Applications**	Major and minor constituents and their function a. Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate. b. Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration. Suggested Applications (Any one): a. To study the use of phenolphthalein in trap cases. b. To analyze arson accelerants. c. To carry out analysis of gasoline.	**February-March**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Class tests after each section and Mid Term test will be taken during the Session

Dr. CHANDRESH KUMARI

Department of Chemistry

Tentative Lesson Teaching Plan

B.Sc IInd Year

Title: Fuel Chemistry and Chemistry of Cosmetics & Perfumes

Course Code: CHEM 204

Dr. Kumari Bandna

Section	Topic	Details	Month	Remarks
A	5. **Fuels** 6. **Coal**	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value. Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas and water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining. Petroleum and Petrochemical Industry:	**July - August**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations, Daily Test will be given to students related to topics

		Composition of crude petroleum, Refining and different types of petroleum products and their applications.		
B	3. **Petroleum and Petrochemicals** 4. **Lubricants**	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels. Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene. Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.	**September-October**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
C	2. **Cosmetics**	A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing	**November-December**	Each topic will be explained by conventional method (Chalk and board) and power point

		and shaving creams), antiperspirants and artificial flavours.		presentations. Assignments, presentations and daily class test will be given to students related to topics
D	3. Essential oils	Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.	February-March	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Daily Class test and Mid Term test will be taken during the Session

Dr. Kumari Bandna

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Department of Chemistry

Tentative Lesson Teaching Plan

B.Sc III Year

Title: POLYNUCLEAR HYDROCARBONS, DYES, HETEROCYCLIC COMPOUNDS AND SPECTROSCOPY (UV, IR, NMR)

Course Code: CHEM 301TH

Dr. Kumari Bandna, Prof. Pooja & Dr. Chanderesh

Section	Topic	Details	Month	Remarks
A	1. **Polynuclear Hydrocarbons** 2. **Synthetic dyes**	Synthesis & reactions of Naphthalene, Anthracene & Phenanthrene. Relative reactivity of these compounds at various positions. Colour and constitution [electronic concept], classification of dyes. Chemistry and synthesis of methyl orange, congo red, malachite green, crystal violet, phenolphthalein, fluorescein, alizarin and indigo.	**July - August**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics
B	**Heterocyclic compounds**	Introduction, Classification and nomenclature, Molecular orbital picture & aromatic	**September -October**	Each topic will be explained by conventional

			characteristics of pyrrole, furan, thiophene & pyridine. Methods of synthesis, chemical reactions with emphasis on mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five & six-membered heterocyclic compounds, preparation & reactions of indole quinoline & isoquinoline with special reference to Fisher indole synthesis Skraup synthesis & Bischler – Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline, & isoquinoline.		method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
C		Application of UV and IR Spectroscopy to Simple Organic Molecules	Application of visible, ultraviolet and Infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, λmax. & ϵmax. chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for	November-December	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to

		calculating λmax. of conjugated dienes and α, β – unsaturated compounds. Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).		students related to topics
D	**Nuclear Magnetic Resonance Spectroscopy**	Principle of nuclear magnetic resonance, number of signals, peak areas equivalent & non-equivalent protons, positions of signals, chemical shift. Shielding & deshielding of protons, proton counting, splitting of signals & coupling constants, magnetic equivalence of protons. Discussion of PMR spectra of molecules: ethyl bromide, n – propyl bromide, isopropyl bromide 1,1-dibromoethane 1,1,2-tribromo ethane, ethanol, toluene, acetaldehyde, acetophenone. Simple problems on PMR spectroscopy for structure	**February-March**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

		determination of organic compounds.		

Note: Daily Class test and Mid Term test will be taken during the Session

1) Dr. Kumari Bandna

2) Dr. Chandresh Kumari

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Tentative Lesson Teaching Plan

B. Sc 3rd Year, Session: 2023-2024

TITLE: POLYMER CHEMISTRY

COURSE CODE: CHEM 305TH (DSE)

Prof. Pooja

Teaching Method: Lecture cum demonstration method, general discussion

SECTION	TOPIC	DETAILS	MONTH	REMARKS
A	Introduction and history of polymeric materials	Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, and Texture of Polymers. Functionality and its importance: Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction, and degree of polymerization. Bifunctional systems, Poly-functional systems.	Aug 1st week-Aug 4thweek	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
B	Kinetics of Polymerization Crystallization and crystallinity	Mechanism and kinetics of step-growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques. Determination of	Sep 1st week - Sep4th week	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related

				to topics.
		crystalline melting point and degree of crystallinity, Morphology of crystalline polymers, and Factors affecting crystalline melting point. Nature and structure of polymers- Structure Property relationships.		
C	Polymer Solution	Determination of molecular weight of polymers (Mn, Mw, etc) by end-group analysis, viscometry, light scattering, and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index. Glass transition temperature (Tg) and determination of Tg, Free volume theory, WLF equation, Factors affecting glass transition temperature (Tg). Criteria for polymer solubility, Solubility parameter, Thermodynamics of polymer solutions, entropy, enthalpy, and free energy change of mixing of polymers solutions, Flory-Huggins theory, Lower and Upper critical solution temperatures.	Oct 1st week – Oct 4th week	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
D	Properties of Polymers (Physical, thermal, Flow	A brief introduction to the preparation, structure, properties, and application of the following polymers:	Nov 1st week - Nov 4th week	Each topic will be explained using conventional

| | & Mechanical Properties) | polyolefins, polystyrene, and styrene copolymers, poly(vinyl chloride) and related polymers, poly(vinyl acetate) and related polymers, acrylic polymers, fluoropolymers, associated polyamides, and polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline, poly(p-phenylene sulphide polypyrrole, polythiophene)]. | | methods (chalk and board). Assignments and presentations will be given to students related to topics. |

TITLE: CHEMICAL TECHNOLOGY & SOCIETY and BUSINESS SKILLS FOR CHEMISTRY

COURSE CODE: CHEM 307TH (SEC)

Prof. Pooja

Teaching Method: Lecture cum demonstration method, general discussion

SECTION	TOPIC	DETAILS	MONTH	REMARKS
A	Chemical Technology	Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by	Aug 1st week-Aug 4th week	Each topic will be explained using conventional methods (chalk and board).

		absorption, and adsorption. An introduction to the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in the chemical industry. Introduction to clean technology.		Assignments and presentations will be given to students related to topics.
B	Society	Exploration of societal and technological issues from a chemical perspective. Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants); energy from natural sources (i.e. solar and renewable forms), from fossil fuels and from nuclear fission; materials like plastics and polymers and their natural analogues, proteins and nucleic acids, and molecular reactivity and interconversions from simple examples like combustion to complex instances like genetic engineering and the manufacture of drugs.	Sep 1st week - Sep4th week	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
C	Business Basics Chemistry	Key business concepts: Business plans, market needs, project management, and routes to market.	Oct 1st week – Oct 4th week	Each topic will be explained using conventional methods (Chalk and board).

				Assignments, and presentations will be given to students related to topics.
D	Making money	Current challenges and opportunities for the chemistry-using industries, role of chemistry in India and global economies.		
		Financial aspects of business with case studies.	Nov 1st week - Nov 4th week	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
	Intellectual property	Concept of intellectual property, patents.		

Prof - Pooja

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LAB COURSE

CHEM 305PR

POLYMER CHEMISTRY LAB

TOPIC	DETAILS	MONTH	REMARKS
Polymer synthesis	Preparation of urea-formaldehyde resin Preparation of novalac resin Preparation of resole resin	September-October	Viva voce Notebooks

Note: Class tests and mid-term tests will be taken during the session. The students will be tested either orally or in writing every week.

Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc Semester-I

Session: 2023-2024

SUBJECT CODE: CHEM 102

Organic Chemistry Theory -1

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Supramolecular Chemistry	Introduction, Bonding other than covalent bond. Addition compounds, Crown ether complexes and Cryptands, Inclusion compounds, Cyclodextrins, Catenanes, and Rotaxenes and their applications.	August	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
II	Stereochemistry	Introduction to Basic Concepts of Stereochemistry: Isomers and their properties, Threo and Erythro isomers, Chirality, Optical isomerism, Geometrical isomerism, Conventions for configurations- D,L and R,S systems, Racemic mixture and Racimization, Resolution of Racemic mixtures, Measurement of optical activity, optical purity, and Streoselective and	August-September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.

		Streospecific reactions, epimerization, epimers, anomers and mutarotation, Axial Chirality (Allenes and Biphenyls), Planar chirality, Helicity, Chirality involving atoms other than carbon atoms, Prochirality: prostreoisomerism and Asymmetric synthesis. Conformational and streoisomerism of acylic and cylic systems, cyclohexane, decalins, effect of conformation on reactivity in acylic and cyclohexane systems.		
III	Reaction Mechanism Effect of structure on reactivity	Structure and Reactivity: Thermodynamic and kinetic requirements, Kinetic and Thermodynamic control, Hammonds postulate, Curtin-Hammett principle. Potential energy diagrams, transition states, and intermediates. Resonance and field effects, steric effect. Quantitative treatment: Hammett equation and linear free energy relationship, Substituent and reaction constants, Taft equation. Methods of determining Reaction mechanisms.	September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
IV	Aliphatic Nucleophilic Substitution	Reactivity effect of substrate structure, leaving group and nucleophile. The SN_2, SN_1, mixed SN_1 and SN_2, SET mechanisms & SNi mechanism. The neighboring	October	Each topic will be explained using conventional methods (chalk and board).

		group mechanism, neighboring group participation by π and σ bonds, anchimeric assistance. Non-classical carbocations, phenonium ions, norbornyl system, common carbocation rearrangements-Wagner-Meerwein, Pinacol-Pinacolone, and Demjanov ring expansion and ring contraction. Nucleophilic substitution at an allylic, aliphatic trigonal, and vinylic carbon. Esterification of carboxylic acid, transesterification, Phase-transfer catalysis, ultrasound, ambident nucleophile, regioselectivity.	.	Assignments and presentations will be given to students related to topics.
V	Aliphatic Electrophilic substitution:	Bimolecular mechanisms- SE_2 and SEi. The SE_1 mechanism, electrophilic substitution accompanied by double bond shifts, halogenation of aldehydes, ketones, acids, and acyl halides. Effect of substrates, leaving group, and the solvent system on reactivity. Aliphatic diazonium coupling, Acylation at aliphatic carbon, alkylation of alkanes, Stork-enamine reactions.	November	Oral test Written test Discussion on the problems

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Tentative teaching plan

Department of Chemistry (2023-2024)

MSc (Semester I)

(CHEM101) (INORGANIC CHEMISTRY)

August

* Group theory. The concept of group, Symmetry elements and symmetry operations, Assignment of point groups to Inorganic molecules, Some general rules for multiplications of symmetry operations, Multiplication tables for water and ammonia, Representations (matrices, matrix representations for C2V and C3V point groups irreducible representations),

*Character and character tables for C2V and C3V point groups. Applications of group theory to chemical bonding (hybrid orbitals for σ-bonding in different geometries and hybrid orbitals for π-bonding. Symmetries of molecular orbitals in BF3, C2H4 and B2H6.

*Revision

*Oral test

*Written test

* Discussion on the problems

September

* Non-Aqueous Solvents: Factors justifying the need of Non Aqueous solution Chemistry and failure of water as a Solvent. Solution chemistry of Sulphuric acid: Physical properties, Ionic self dehydration in H2SO4, high electrical conductance in spite of high viscosity, Chemistry of H2SO4 as an acid, as an dehydrating agent, as an oxidizing agent, as an medium to carry out acid-base neutralization reaction and as a differentiating solvent. Liquid BrF3: Physical properties, solubilities in BrF3 , self ionization, acid base neutralization reactions, solvolytic reactions and formation of transition metal fluorides. Chemistry of Molten salts as Non-Aqueous

Solvents: Solvent properties, solution of metals, complex formation, Unreactivity of molten salts, Low temperature molten salts.

*Revision

*Oral test

*Written test

* Discussion on the problems

October-November

* Inorganic Hydrides: Classification, preparation, bonding and their applications. Transition metal compounds with bonds to hydrogen, carbonyl hydrides and hydride anions. Classification, nomenclature, Wade's Rules, preparation, structure and bonding in boron hydrides (boranes),carboranes, metalloboranes and metallocarboranes.

*Organic Reagents in Inorganic Chemistry: Chelation, factors determining the stability of chelates (effect of ring size, oxidation state of the metal, coordination number of the metal); Use of the following reagents in analysis: (a) Dimethylglyoxime (in analytical chemistry) (b) EDTA (in analytical chemistry and chemotherapy) (c) 8-Hydroxyquinoline (in analytical chemistry and chemotherapy) (d) 1,10-Phenanthroline (in analytical chemistry and chemotherapy) (e) Thiosemicarbazones (in analytical chemistry and chemotherapy) (f) Dithiazone (in analytical chemistry and chemotherapy). Supramolecular chemistry.

*Revision

*Oral test

*Written test

* Discussion on the problems

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M. Sc, Semester-I,

Session: 2023-2024

SUBJECT CODE: CHEM 103

Physical Chemistry Theory -1

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I		Theory of nuclear magnetic resonance NMR phenomenon, the chemical shift and its measurement. The fine structure (spin – spin coupling). Factors influencing chemical – shift and spin – spin coupling. Non - first – order spectra. Relaxation phenomena in NMR: spin – spin and spin – lattice relaxation processes. Line –width and rate processes. Theory of Electron Spin Resonance (ESR) phenomenon. Fine and hyperfine structure of ESR. Zero – field splitting of ESR signal. Mapping of charge density on molecule (McConnell relation). Mossbaur spectroscopy: a brief introduction (isomer – shift, quadrupole interaction and magnetic hyperfine interaction).	September	
II	Rotational spectra	Rotational spectra of non-rigid diatomic molecules and symmetric - top molecules. Strak effect. Anharmonic oscillator, overtones and hot bands. Diatomic vibrator – rotator (P, Q	October	

		and R – branches of diatomic vibrator – rotator). Rotational – vibrational spectra of symmetric – top molecules. Raman Spectroscopy: qualitative quantum theory of Raman scattering. Rotational Raman spectra of linear and symmetric – top molecules. Vibrational Raman spectra and mutual exclusion principle.		
III	Kinetics of complex reactions	Consecutive and competitive (parallel) first-order reactions. Kinetic vs. thermodynamic control reaction. Free radical reactions; thermal ($H_2 - Br_2$) and photochemical $H_2 - Cl_2$) reactions. Rice – Herzfeld mechanism of dissociation of organic molecules viz. dissociation of ethane, decomposition of acetaldehyde as 3/2 or ½ order reactions. Reaction rates and chemical equilibrium, the principle of microscopic reversibility, activation energy, and activated complex.	September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics
IV		Transition state theory and its kinetic and thermodynamic formulation. Introduction to Potential Energy Surfaces. Kinetics in solutions: diffusion-controlled reactions, their rates, and influence of the solvent. Collisions and transition state theories in simple gas reactions, Lindman and Hinshelwood treatment.	October	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.

Sandmeyer reaction: p-chlorotoluene from p-toluidine, Aldol condensation: Dibenzal acetone from benzaldehyde. Acetoacetic ester condensation: Synthesis of ethyl-n-butylacetoacetate, Preparation of iodoform from acetone (Haloform reaction). Preparation of polystyrene, anthranilic acid, fluoresceine-eosin, methyl orange dyes, and any other reaction as per requirement. All the students must submit the recrystallized product along with yield, and melting point for all the stages of preparation.			

CHEM 108

Physical Chemistry Practical -1

TOPIC	DETAILS	MONTH	REMARKS
Surface tension measurements	Surface tension of pure solvents.	September	Viva-voce Notebooks
Chemical Kinetics	Acid hydrolysis of ethyl acetate	October	Viva-voce Notebooks

Note: During the session, practicals will be conducted, and class and mid-term tests will be taken. The students will be tested either orally or in writing every week.

(ANITA)
Prof. Pooja

V	Catalytic activity at surfaces	Adsorption and catalysis, the Langmuir – Hinshelwood mechanism, and the Eley – Ridealmechanism. Examples of catalysis: hydrogenation, oxidation, cracking, and reforming (qualitative treatment only). Introduction to fast reactions. Flash photolysis and Stopped flow methods to study the kinetics of fast reactions.	November	Each topic will be explained using conventional methods (Chalk and board). Assignments and presentations will be given to students related to topics.

M. Sc, Semester-I

CHEM 107

Organic Chemistry Practical -1

TOPIC	DETAILS	MONTH	REMARKS
Demonstrations of Laboratory & Purification techniques	Refluxing, Solvent extraction, and Purification of solvents and reagents using various techniques like crystallization, distillation, steam distillation, and vacuum distillation. Drying and storage of solvents, sublimation, etc.	September	Viva-voce Notebooks
Preparation of some important organic compounds	Preparation of some important organic compounds involving the reactions out of the following representative reactions Acetylation, Esterification, Oxidation, Reduction, Nucleophilic substitution, Aromatic electrophilic substitution reaction, Condensation reactions, Hoffman's Bromamide reaction. Oxidation: Adipic acid by chromic acid oxidation of cyclohexanol, Grignard reaction: Synthesis of triphenylmethanol from benzoic acid.	October	Viva-voce Notebooks

M. Sc, Semester-I,

Session: 2023-2024

Mathematics for Chemists

SUBJECT CODE: CHEM 104

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Differential calculus:	Differential calculus: Idea of functions, Limit and Continuity, functions of single and several variables, derivatives, partial derivatives, total derivative. Graphical representation of differentiation, Rules of Differentiation, maxima and minima. Some examples related to chemistry: (i) Calculation of the rate of change of λ with θ in Bragg equation, (ii) Calculation of equilibrium separation between two helium atoms separated by a distance R in the Lennard-Jones potential V, (iii) Calculation of , from the ideal gas equation, (iv) Calculation of for The Maxwell Boltzmann Distribution of molecular velocities, (v) Calculation of for the reaction $N_2O_4 \rightleftharpoons 2\ NO_2$, where $p(N_2O_4)$	September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics
II	Integral calculus	Integral calculus: Methods of integration, geometric interpretation of integral,	October	Each topic will be explained using conventional methods (chalk

		evaluation of some simple definite integrals. Significance of _exponential' equations. Some integrals related to chemistry: (i) The significance of _exponential' equations, (ii) Calculation of work done on an ideal gas compressed isothermally using relation , (iii) Rate expressions for Zero and First orde		and board). Assignments and presentations will be given to students related to topics
III	Differential equations	Differential equations: Types and classification of differential equations, homogeneous differential equations, exact differential equations, linear equations, and differential equations of first and second orders, Solution of first order differential equations. Application to simple chemistry problems: Solving Particle in one dimensional box by taking (a) trigonometric functions (b) exponential functions	September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics
IV	Matrices and Determinants	Matrices and Determinants: Definition of matrix, types of matrices (row, column, null, square, diagonal). Matrix algebra: Multiplying a matrix by a constant, addition, subtraction and multiplication of two matrices. Transpose and adjoint of a matrix, elementary transformation, representation and applications to solutions of linear equations. Application of Matrices to simple chemistry problems: (i) Finding the atom	October	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.

		connectivity matrix for molecules like but-1-ene (hydrogens ignored), (ii) Writing Huckel Molecular Orbital secular equations for 1,3 butadiene, cyclobutadiene, benzene, water, Ammonia.		
V	Vectors	Vectors: representation and simple properties of vectors, addition and subtraction of vectors, addition by the method of triangles, resolution of vectors. Scalar product of vectors. Concept of normalization, orthogonality and complete set of unit vectors. Application to simple chemistry problems:(i) Calculation of speed of particle moving with velocity ( ) in twodimensional space, three-dimensional space, (ii) calculation of work done (w) by the vector force on a particle of velocity ( ) in the given time interval using .	November	Each topic will be explained using conventional methods (Chalk and board). Assignments and presentations will be given to students related to topics.

Dr. Naresh Kumar

APPLICATION OF COMPUTER IN CHEMISTRY

SUBJECT CODE: CHEM 105

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Introduction	Introduction: Characteristics of Computer, Evolution of computer, Capabilities and limitations of computer, Generations of computer, Types of computers (micro, mini, main frame, supercomputers), Block diagram of computer, Basic components of a computer system, Input unit, Output unit, Arithmetic logic Unit, Control unit and Central Processing Unit.	September	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics
II	Computer Software	Computer Software: Software and its Need, Types of softwares, System software, Application software, operating system, utility program, programming languages, introduction to operation system for PCs-DOS, windows, linux, application software and its types – word processing, spreadsheet, presentation and graphics.	October	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics
III	Internet Concepts	Internet Concepts: Basics of Networking – LAN, WAN, Wi-Fi technologies and sharing	September	Each topic will be explained using conventional

		of printers and other resources, Concept of IP addresses, applications of internet like: e-mail and browsing, concept of search engine and safe searching. Various browsers like Internet explorer/Microsoft Edge, Mozilla Firefox, use of cookies and history, WWW (World Wide Web), hyperlinks and introduction to Anti-virus.		methods (chalk and board). Assignments and presentations will be given to students related to topics
IV	Chemistry and FORTRAN Programming	Chemistry and FORTRAN Programming: Introductory FORTRAN concepts, character set, constant variables, data types, subscripted variables, and FORTRAN functions. Data transfer and program execution control: Introduction, format specification for READ and WRITE statements, format commands, control commands and transfer commands. Logical variable and Double precision variables	October	Each topic will be explained using conventional methods (chalk and board). Assignments and presentations will be given to students related to topics.
V	Arrays and repetitive computation	Arrays and repetitive computation: Introduction, arrays arrange storage, dimension statement, do continue, Nested do – loop continue statement, implied do. Sub – programme (functions and sub –routines): COMMON and DATA statements. Sub programme, function arguments, subroutines, save variable function vs. subroutine programme.	November	Each topic will be explained using conventional methods (Chalk and board). Assignments and presentations will be given to students related to topics.

M.Sc Semester-II, Session: 2023-2024

SUBJECT CODE: CHEM 202
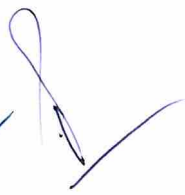
Organic Chemistry Theory -2
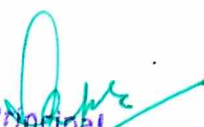
Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Aromatic Electrophilic Substitution	Arenium ion mechanism, orientation, and reactivity, The ortho/para ratio, ipso attack, orientation in other ring systems. Quantitative treatment of reactivity in substrates and electrophiles, Diazonium coupling, Vilsmeir - Haack reaction, Scholl reaction, Amination reaction, Fries rearrangement, Hofmann-Martius Reaction, Reversal of Friedel Craft alkylation.	February	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
II	Common Organic Reactions and Their Mechanisms	Perkin condensation, Michael reaction, Robinson annulation, Diekmann reaction, Stobbe condensation, Mannich reaction, Knoevenagel condensation, Benzoin condensation, Witting reaction, Hydroboration, Hydrocarboxylation, Ester hydrolysis, Epoxidation.	March	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
III	Reagents in Organic Synthesis	Synthesis and applications of BF_3, NBS, Diazomethane, Lead tetra-acetate, Osmium tetraoxide, Woodward Prevorst hydroxylation reagent, $LiAlH_4$,	March	Each topic will be explained using conventional methods (chalk

				and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
IV	Elimination Reactions	Discussion of E_1, E_2, E_1cB, and E_2C Mechanisms and Orientation, Reactivity: Effects of substrate structures, attacking the base, leaving group and medium. Mechanism and Orientation in Pyrolytic eliminations, Cis elimination, elimination in cyclic systems, eclipsing effects, cleavage of quaternary ammonium hydroxides, Shapiro reaction, Conversion of Ketoxime to nitriles.	April	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
V	Pericyclic Reactions	Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5 hexatrienes and allyl system. Classification of pericyclic reactions, Woodward-Hoffmann correlation diagrams. FMO and PMO approach. Electrocyclic reactions: conrotatory and disrotatory motions, 4n and 4n+2 and allyl systems. Cycloadditions-antarafacial and suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, 1,3 dipolar cycloadditions and chelotropic reactions. Sigmatropic rearrangements-Suprafacial and Antarafacial shifts of H, sigmatropic shifts	May	Oral test Written test Discussion on the problems

		involving carbon moieties, Claisen, Cope and aza-Cope rearrangements, Ene reaction.		

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Tentative teaching plan

Department of Chemistry (2023-24)

SEMESTER-II

(CHEM 201) (INORGANIC CHEMISTRY)

February

Metal-Ligand Bonding-I: Recapitulation of Crystal Field Theory including splitting of d-orbitals in different environments, Factors affecting the magnitude of crystal field splitting, structural effects (ionic radii, Jahn-Teller effect), Thermodynamic effects of crystal field theory (ligation, hydration and lattice energy), Limitations of crystal field theory, Adjusted Crystal Field Theory (ACFT), Evidences for Metal-Ligand overlap in complexes, Molecular Orbital Theory for octahedral, tetrahedral and square planar complexes (excluding mathematical treatment)

*Revision

*Oral test

*Written test

* Discussion on the problems

March

* Atomic Spectroscopy: Energy levels in an atom, coupling of orbital angular momenta, coupling of spin angular momenta, spin orbit coupling, spin orbit coupling p2 case, Determining the Ground State Terms-Hund's Rule, Hole formulation (derivation of the Term Symbol for a closed sub-shell, derivation of the terms for a d2 configuration), Calculation of the number of the microstates.

*Electronic Spectra-I: Splitting of spectroscopic terms (S,P,D.F and G,H,I), d1 -d9 systems in weak fields (excluding mathematics), strong field configurations, transitions from weak to strong crystal fields.

*Revision

*Oral test

*Written test

* Discussion on the problems

April

* Electronic Spectra-II: Correlation diagrams (d1 -d9) in Oh and Td environments, spin-cross over in coordination compounds. Tanabe Sugano diagrams, Orgel diagrams, evaluation of B,C and β parameters.

* Magnetochemistry: Origin of Magnetic moment, factors determining paramagnetism, application of magnetochemistry in co-ordination chemistry (spin only moment, Russell Saunder's coupling, quenching of orbital angular moment, orbital contribution to a magnetic moment) in spin free and spin paired octahedral and tetrahedral complexes.

*Revision

*Oral test

*Written test

* Discussion on the problems

May

*Magnetic susceptibility (diamagnetic, paramagnetic), magnetic moments from magnetic susceptibilities, Van Vlecks formula for magnetic susceptibility, temperature dependence of magnetic susceptibility.

*Revision

*Oral test

*Written test

* Discussion on the problems

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M. Sc Semester-II, Session: 2023-2024

SUBJECT CODE: CHEM 203

Physical Chemistry Theory -2

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Chemical Thermo-dynamics-I	Brief resume of laws of thermodynamics, Free energy functions, Gibb's and Helmholtz free energy functions and their significance, Gibbs -Helmholtz equation, thermodynamic equilibria and free energy functions, applications of Gibbs-Helmholtz equation, Clapeyron-Clausius equation, Thermodynamics of Elevation in boiling point, depression in freezing point, relation between osmotic pressure and elevation of boiling point, relation between osmotic pressure and depression in freezing point.	February	Each topic will be explained using conventional methods (chalk and board) and PowerPointpresentations. Assignments and presentations will be given to students related to topics
II	Chemical Thermo-dynamics-II	Chemical affinity, applications of chemical affinity, methods for determining the chemical affinity, partial molar properties, Physical significance of partial molar properties, chemical potential, Gibbs Duhem equation, variation of chemical potential with temperature and pressure, chemical potential of a pure solid or liquid, chemical potential of a pure ideal gas and mixture of ideal gases, thermodynamic functions of mixing, fugacity, fugacity	March	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students

		coefficient, determination of fugacity, variation of fugacity with temperature and pressure, Lewis Randall rule, Duhem Margules equation, activity, activity coefficient, determination of activity and variation with temperature and pressure.		related to topics
III		* Thermodynamic derivation of phase rule and its application to two component systems. Distribution law, its thermodynamic derivation and application. Zeroth law of thermodynamics.	February	
IV	Non–Equilibrium Thermodynamics	Non–Equilibrium Thermodynamics: Basic principles of non – equilibrium thermodynamics: Rate laws, second law of thermodynamics for open system, law of conservation of mass, charge and energy flow, electrokinetic phenomena and expressions for streaming potential, electro-osmotic pressure difference, streaming potential using the linear phenomenological equation.	March	
V	Colloidal State	Classification of colloids, charge, and stability of colloidal dispersions, Hardy-Schulze Law, gold number, electrical properties of colloids, electrical double layer and its structure, Stern's theory of double layer, zeta-potential, electrophoresis and electro-osmosis, emulsions and their classification, emulsifiers, gels, and their classification.	April	Oral test Written test Discussion on the problems

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M.Sc Semester-II, Session: 2023-2024

Chemistry of life science

SUBJECT CODE: CHEM 204

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Cell structure and function	Cell structure and function: Basic concepts, Structure of prokaryotic and eukaryotic cells, intracellular organelles and their functions, comparison of plant and animal cells.	February	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
II	Carbohydrates	Carbohydrates: Structure and biological functions of important monosaccharides (excluding detailed conformational analysis), Disaccharides- sucrose, lactose and maltose, and polysaccharides (cellulose and chitin).	March	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
III	Carbohydrate Metabolism	Carbohydrate Metabolism: Overview of metabolic processes (catabolic and anabolic), energy transfer processes, role and significance	March	Each topic will be explained using conventional methods (chalk

				and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
IV	Proteins and lipids	Proteins and lipids: Amino acids, Peptide bond, Chemical and enzymatic hydrolysis of proteins to peptides, Denaturation of Proteins. Biosynthesis of proteins. Lipid aggregates-micelles, bilayers, and their possible biological functions. Biological membranes. . Introductory idea of metabolism of proteins and lipids	April	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
V	Nucleic acids	Nucleic acids: Purine and pyrimidine bases of nucleic acids, base pairing via H-bonding. Structure of ribonucleic acids (RNA) and deoxyribonucleic acids (DNA), double helix model of DNA and forces responsible for holding it. Chemical and enzymatic hydrolysis of nucleic acids. The Chemical basis for heredity, an overview of replication of DNA, transcription, translation and genetic code. Chemical synthesis of mono and trinucleoside	May	Oral test Written test Discussion on the problems

of ATP (the biological energy currency). Carbohydrate metabolism: glycolysis and Kreb's cycle. (continued from previous cell in first data row)

Dr. Vikas

M.Sc Semester-II, Session: 2023-2024

Environmental Chemistry

SUBJECT CODE: CHEM 205

Teaching Method: Lecture cum demonstration method, general discussion

UNIT	TOPIC	DETAILS	MONTH	REMARKS
I	Environmental Chemistry	Environmental Chemistry: Atmosphere, environmental segments, composition of the atmosphere, earth's radiation balance, particulates, ions and radicals and their formation, chemical and photochemical reactions in the atmosphere, air pollution, oxides of C,N,S and their effects, acid-rain, smog formation, Green house effects (global warming and ozone depletion, air pollution controls.	February	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
II	Hydrosphere	Hydrosphere: Chemical composition of water bodies-lakes, streams, rivers, sea etc, hydrological cycle, complexation in natural and waste water and microbially mediated redox reactions. Water pollution-inorganic, organic, pesticides, industrial and radioactive materials, oil spills and oil pollutants, eutrophication, acid-mine drainage, waste water treatment, domestic waste water (aerobic and anaerobic treatment), and industrial waste water treatment.	March	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
III	Water quality	Water quality parameters and	March	Each topic will

	parameters and standards	standards: Analytical methods for measuring DO, BOD, COD, fluoride, oils and grease and metals (As, Cd, Hg, Pb, Zn,Cu,Cr), Biochemical effects of As, Cd, Hg, Pb, Cr, CN and pesticides. Lithosphere: Soil composition, micro and macro nutrients, soil pollution- fertilizers, pesticides.		be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
IV	Environmental analytic chemistry	Environmental analytic chemistry: Introduction to analytical methods for monitoring air and water pollution. Theory and applications of Atomic absorption spectroscopy, UV-Visible and Infrared Spectroscopy, HPLC (High performance liquid chromatography) and Gas chromatography techniques used in pollution analysis.	April	Each topic will be explained using conventional methods (chalk and board) and PowerPoint presentations. Assignments and presentations will be given to students related to topics.
V	Green Chemistry	Green Chemistry: Introduction and need for Green Chemistry. Goals of Green Chemistry. Principles of Green Chemistry with their explanations. Green chemistry in sustainable development	May	Oral test Written test Discussion on the problems

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CHEM 207

Organic Chemistry Practical -2

TOPIC	DETAILS	MONTH	REMARKS
Qualitative Organic Mixture Analysis	Separation, purification, and identification of a binary mixture of organic compounds by chemical tests. Separation of binary mixtures: using H_2O, HCl, NaOH, $NaHCO_3$, Ether, or other reagents as may be necessary along with required conditions for their use.	February-March	Viva-voce Notebooks
Systematic identification of mixtures of pure organic compounds	Separation and identification of simple binary mixtures having acidic, basic, and neutral components. Preparation of their derivatives, determination of b.p./m.p. for components and their derivatives.	April	Viva-voce Notebooks

CHEM 208

Physical Chemistry Practical -2

TOPIC	DETAILS	MONTH	REMARKS
Thermochemistry	Determination of water equivalent of a thermos flask, and estimation of the heat of neutralization for a strong acid strong base, the heat of hydration, and solution of salts.	March	Viva-voce Notebooks

Note: During the session, practicals will be conducted, and class and mid-term tests will be taken. The studentswill be tested either orally or in writing every week.

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SEMESTER II (CHEM 206)

(INORGANIC CHEMISTRY PRACTICAL-2)

February- March

Analysis of mixtures by gravimetric and volumetric methods from the mixture solutions: 1. Copper- Nickel 2. Iron-Magnesium, Silver-Zinc ,Copper-Nickel-Zinc ,Fe(II)-Fe(III)

Commercial analysis

April

Green methods of Preparation of the following: (i) Bis(acetylacetonato)copper(II) (ii) Tris(acetylacetonato)iron(III) (iii) Tris(acetylacetonato)manganese(III

* Revision

*Viva-Voce

*Note-books

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Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IIIrd Semester

Title: Inorganic Chemistry Theory -3

Course Code: CHEM 301

Section	Topic	Details	Month	Remarks
Unit-1	Metal π Complexes	Metal π Complexes: Preparation, reactions, structures and bonding in carbonyl, nitrosyl and phosphine complexes, structural evidences from vibrational spectra. Structure and bonding in metal cyanides, stabilization of unusual oxidation states of transition metals	**July 3rd Week -4th Week**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics
Unit-II	Introductory Analytical Chemistry	Introductory Analytical Chemistry: Data Analysis- Types and sources of errors, propagation of errors, detection and minimization of various types of errors. Accuracy	**August**	Each topic will be explained by conventional method (Chalk and board) and

		and precision, average and standard deviation, variance, its analysis and confidence interval, tests of significance (F-test, t-test and paired t-test), criteria for the rejection of analytical data (4d rule, 2.5d rule, Q-test, average deviation and standard deviation), and least-square analysis.		power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Photoelectron Spectroscopy	Photoelectron Spectroscopy: Basic principle, photoionization process, ionization energies, Koopman's theorem, ESCA, photoelectron spectra of simple molecules, (N_2, O_2) Photoelectron spectra for the isoelectronic sequence Ne, HF, H_2O, NH_3 and CH_4, chemical information from ESCA, Auger electron spectroscopy — basic idea.	**September**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-IV	Lanthanides and Actinides	Lanthanides and Actinides:- Spectral and magnetic properties, comparison of Inner transition and transition metals, Transuranium elements (formation and colour of ions in aqueous solution),uses of lanthanide compounds as shift reagents, periodicity	**October**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations

				and daily class test will be given to students related to topics
Unit-V	Nuclear Chemistry	Nuclear Chemistry: Nuclear binding energy and stability, nuclear models (nuclear shell model and collective model). Nuclear reactions: types of reactions, nuclear cross-sections, Q-value. Natural and artificial radioactivity, radioactive decay and equilibrium, Nuclear fission, fission product and fission yields, Nuclear fusion. Radioactive techniques: Tracer technique, (neutron activation analysis), Counting techniques such as G.M. Ionization and proportional counters.	**November**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Practical Classes will be held Simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

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Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IIIrd Semester

Title: Inorganic Chemistry Special Theory -1

Course Code: CHEM 304

Section	Topic	Details	Month	Remarks
Unit-1	Inorganic Photochemistry:	Inorganic Photochemistry: Basic principles, absorption, excitation, kasha rule, electronically excited state, its life-time and energy dissipation process. Photochemical behavior of transition metal complexes, charge transfer spectra of crystalline and gasous alkali halides. Photochemistry of chromium(III) octahedral complexes, $[Cr(H_2O)_6]^{3+}$ and $[Cr(NH_3)_6]^{3+}$. Photochemistry of cobalt (III) complexes, $[Co(NH_3)_5X]^{2+}$ and $[Co(en)_3]^{3+}$.	July 3rd Week -4th Week	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics
Unit-II	Inorganic Reactions and Mechanism:	Inorganic Reactions and Mechanism: Substitution reactions in octahedral	August	Each topic will be explained by

		complexes, acid hydrolysis reactions, base hydrolysis and anation reactions, substitution reaction, reactions occurring without rupture of metal-ligand bond. Substitution reactions of square planar complexes. Theories of trans-effect, labile and inert complexes. Mechanism of redox		conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Polymeric Inorganic Compounds	Polymeric Inorganic Compounds: General chemical aspects (synthesis, properties and structure)of phosphazenes, borazines, silicones, sulphur- nitrogen cyclic compounds and condensedphosphates	September	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-IV	Stability of Coordination Compounds	Stability of Coordination Compounds – Stability constants, stepwise formation constants, overall formation constants, relationship between stepwise and overall formation constants, factors affecting	October	Each topic will be explained by conventional method (Chalk and board) and power point presentations.

| | | the stability constants (with special reference to metal and ligand ions), Difference between thermodynamic and kinetic stability. Determination of stability constants by: (i) Spectrophotometric methods (Job's method, Mole ratio and slope ratiomethod). (ii) Bjerrum's method (iii) Polarographic method | | Assignments, presentations and daily class test will be given to students related to topics |
| Unit-V | Electronic Spectra – III | Electronic Spectra – III (Electronic spectra of complex ions): Selection rules (Laporte, orbital and spin selection rules), band intensities, band widths, spectra in solids, spectra of aqueous solutions of d1-d9 ions in Oh and Td environments, Evaluation of 10 Dq, Spectrochemical and Nephelauxetic series, charge- transfer spectra. | November | Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics |

Note: Practical Classes will be held simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

1. Dr. Chandresh Kumar

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Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IIIrd Semester

Title: Organic Chemistry Theory -3

Course Code: CHEM 302

Section	Topic	Details	Month	Remarks
Unit-1	Ultra Violet and Visible Spectroscopy:	Ultra Violet and Visible Spectroscopy: Electronic transitions (185-800 nm), Beer- Lambert Law, Effect of solvent on electronic transitions, Ultra Violet bands of carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes, Steric effect in biphenyls, Fieser-Woodward rules for conjugated dienes and carbonyl compounds, ultra violet spectra of aromatic and heterocyclic compounds.. Applications of UV- visible spectroscopy in organic chemistry.	**July 3rd Week -4th Week**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

Unit-II	Infrared Spectroscopy	Infrared Spectroscopy: Principle, Instrumentation and sample handling, Characteristic vibrational frequencies of common organic compounds, Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance. Introduction to Raman spectroscopy. Applications of IR and Raman spectroscopy in organic chemistry.	August	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Nuclear Magnetic Resonance (NMR) Spectroscopy	Nuclear Magnetic Resonance (NMR) Spectroscopy: General introduction, chemical shift, spin-spin interaction, shielding mechanism, chemical shift values and correlation of protons present in different groups in organic compounds. chemical exchange, effect of deuteration, complex spin-spin interaction between two, three, four and five nuclei, virtual coupling. Stereochemistry, hindered rotation, Karplus-relationship of coupling constant with dihedral angle. First and second order spectra, Simplification of complex spectra-nuclear magnetic	September	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

		double resonance, spin tickling, INDOR, contact shift reagents, solvent effects. Fourier transform technique, nuclear Overhauser effect (NOE). Introduction to resonance of other nuclei − 13C NMR, 2-D and 3-D NMR, Applications of NMR in organic chemistry		
Unit-IV	Mass Spectrometry	Mass Spectrometry: Introduction, ion production—EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, and ion abundance. Mass spectral fragmentation of organic compounds with common functional groups, Molecular ion peak, Meta-stable peak, McLafferty rearrangement. Nitrogen Rule. Examples of mass spectral fragmentation of organic compounds with respect to their structure determination. Introduction to negative ion Mass spectrometry, TOF-MALDI. Problems based upon IR, UV, NMR and mass spectroscopy.	October	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-V	Photochemistry – I	Photochemistry – I: Introduction and Basic principles of photochemistry. Interaction of electromagnetic radiations	November	Each topic will be explained by conventional method (Chalk and

| | | with matter, Types of excitations, fate of excited molecules, quantum yield, transfer of excitation energy, actinometry. Photochemistry of alkenes: cis-trans isomerization, dimerization of alkenes, photochemistry of conjugated olefins, photooxidation of alkenes and polyenes Photochemistry of Aromatic compounds: Isomerization, addition and substitution, photo-reduction of aromatic hydrocarbons. Photochemistry – II: Photochemistry of Carbonyl compounds: Norrish Type I and II, Intermolecular and Intramolecular hydrogen abstraction, PaternoBuchi reaction, α and β- cleavage reactions of cyclic and acyclic carbonyl compounds, Formation of oxetane and cyclobutane from α,β unsaturated ketones, Photo-reduction of carbonyl compounds, Photorearrangement of enones, dienones, epoxyketones, Photo Fries rearrangement. | | board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics |

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Tentative Lesson Teaching Plan

M.Sc IIIrd Semester

Title: Physical Chemistry Theory -3

Course Code: CHEM 303

Section	Topic	Details	Month	Remarks
Unit-1	Statistical Thermodynamics	Statistical Thermodynamics Basic Terminology: probability, phase space, micro and macro states, thermodynamic probability, statistical weight, assembly, ensemble, The most probable distribution: Maxwell-Boltzmann distribution, quantum statistics: The BoseEinstein statistics and Fermi- Dirac Statistics. Thermodynamic probability (W) for the three types of statistics. Lagrange's undetermined multipliers. Stirling's approximation, Molecular partition function and its importance. Applications	July 3rd Week -4th Week	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

		to ideal gases: The molecular partition function and its factorization. Evaluation of translational, rotational and vibrational partition functions, the electronic and nuclear partition functions. for monatomic, diatomic and polyatomic gases.		
Unit-II	Thermodynamic properties of molecules	Thermodynamic properties of molecules from partition function: Total energy, entropy, Helmholtz free energy, pressure, heat content, heat capacity and Gibb's free energy, equilibrium constant and partition function, Heat capacity of crystals and statistical thermodynamics, Third law of thermodynamics and entropy. Ortho- and para-hydrogen, statistical weights of ortho and para states, symmetry number. Calculation of equilibrium constants of gaseous solutions in terms of partition function, Einstein theory and Debye theory of heat capacities of monatomic solids.	August	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Basic Quantum Chemistry UNIT – III	Basic Quantum Chemistry Operators in quantum mechanics. Introduction to angular momentum. Eignvalues and	September	Each topic will be explained by conventional method

		cignfunctions. Hermitian operator. Postulates of quantum mechanics. Time dependent and time independent Schrodinger wave equationsPhotochemistry		(Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-IV	Some analytically soluble problems	Some analytically soluble problems (complete solutions) of particle in a one and three dimensional box, harmonic – oscillator, the rigid rotor, the hydrogen atom and the quantum mechanical tunnelling.	October	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-V	Photophysical processes	Photophysical processes of electronically excited molecules (Jablonski Diagram). Franck-Condon principle. Kinetics of Excimer and exciplex formation. Energy transfer from electronically excited molecules (Stern – Volmer mechanism). E- type and P- type delayed	November	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations

		fluorescence.		and daily class test will be given to students related to topics

Note: Practical Classes will be held simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

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4 Prof. Pooja

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Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IVth Semester

Title: Inorganic Chemistry Special Theory -4

Course Code: CHEM 403

Section	Topic		Month	Remarks
Unit-1	Infrared Spectroscopy:	Infrared Spectroscopy: Theory of IR absorption, Types of vibrations, Observed number of modes of vibrations, Intensity of absorption bands, Theoretical group frequencies, Factors affecting group frequencies and band shapes (Physical state, Vibrational Coupling, Electrical effects, Resonance, Inductive effects, Ring strain) Vibrational-rotational fine-structure. Experimental method. Applications of IR to the following: (i) Distinction between (a) Ionic and coordinate	**February**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

		anions such as NO3- , SO4 2- and SCN- (b) Lattice and coordinated water. (ii) Modes of bonding of ligands such as urea and dimethylsulphoxide.		
Unit-II	Nuclear Magnetic Resonance Spectroscopy:	Nuclear Magnetic Resonance Spectroscopy: Introduction, Chemical shift, Mechanism of electron shielding and factors contributing to the magnitude of chemical shift, Nuclear overhausser effect, Double resonance, Chemical exchange, Lanthanide shift reagents and NMR spectra of paramagnetic complexes. Experimental techniques (CW and FT). Stereochemical non-rigidity and fluxionality: Introduction, use of NMR in its detection in PF_5, $Ti(acac)_2Cl_2$, $Ti(acac)_2Br_2$, $Ta_2(OMe)_{10}$	February4 th week- March1st Week	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit- III	Nuclear Quadrupole Resonance Spectroscopy	Nuclear Quadrupole Resonance Spectroscopy: Basic concepts of NQR (Nuclear electric quadrupole moment, Electric field gradient, Energy levels and NQR frequencies), Effect of magnetic field on spectra, Factors affecting the resonance signal (Line shape, position of	March IInd Week- March IVth Week	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily

		resonance signal) Relationship between electric field gradient and molecular structure. Structural information of the following: PCl5, TeCl4, Na+GaCl4- , BrCN, and Hexahalometallates		class test will be given to students related to topics
Unit-IV	Mössbauer Spectroscopy:	Mössbauer Spectroscopy: Introduction, Principle, Conditions for Mössbauer Spectroscopy, Parameters from Mössbauer Spectra- Isomer shift, Electric Quadrupole Interactions, Magnetic Interactions, MB instrumentation, Applications of MB spectroscopy in structural determination of the following: i) High spin Fe (II) and Fe (III) halides- FeF2, FeCl2.2H2O, FeF3, FeCl3.6H2O. ii) Low spin Fe(II) and Fe(III) Complexes- Ferrocyanides, Ferricyanides, Prussian Blue. iii) Iron carbonyls. Fe(CO)5, Fe2(CO)9 and Fe3 (CO)12 iv) Inorganic Sn(II) and Sn(IV) halides	April	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-V	Electron Spin Resonance Spectroscopy	Electron Spin Resonance Spectroscopy:-. Introduction, Similarities between ESR and NMR, Behaviour of a free electron in an external Magnetic Field, Basic	May	Each topic will be explained by conventional method (Chalk and board) and

| | | Principle of an Electron Spin Resonance Spectrometer, Presentation of the spectrum, Hyperfine coupling in Isotropic Systems (methyl, benzene and Naphthalene radicals). Factors affecting the magnitude of gvalues. Zero field splitting and Kramer's Degeneracy, Line width in solid state ESR, Double resonance technique in e.s.r. (ENDOR) Experimental method. Applications of ESR to the following: 1. Bis-Salicylaldiimine – Copper (II) 2. $CuSiF_6.6H_2O$ & $(NH_3)_5Co-O.Co(NH_3)_5$ | | power point presentations. Assignments, presentations and daily class test will be given to students related to topics |

Note: Practical Classes will be held simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

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Tentative Lesson Teaching Plan

M.Sc IVth Semester

Title: Inorganic Chemistry Special Theory -5

Course Code: CHEM 404

Section	Topic		Month	Remarks
Unit-1	1) Metallopo rphyrins: **2)** Metalloen zyme	(a) Metalloporphyrins: Porphyrins and their salient features, characteristic absorption spectrum of porphyrins, chlorophyll (structure and its role in photosynthesis). Transport of Iron in microorganisms (siderophores), types of siderophores (catecholate and Hydroxamato siderophores). (b) Metalloenzymes: Definitions: Apoenzyme, Coenzyme, Metalloenzyme, structure and functions of Carboxy peptidases and Carbonic anhydrase.	**February**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics
Unit-II	Oxygen Carriers Synthetic oxygen carriers	Oxygen Carriers: a) Natural oxygen carriers: Structure of hemoglobin	**February 4th week- March 1st**	Each topic will be explained by

			Week	conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
		and myoglobin, Bohr effect, Models for cooperative interaction in hemoglobin, oxygen Transport in human body (-perutzmachanism), Cyanide poisoning and its remedy. Non-heme protiens (Hemerythrin & Hemocyanin). b) Synthetic oxygen carriers: Oxygen molecule and its reduction products, model compounds for oxygen carrier (Vaska's Iridium cjomplex, cobalt complexes with dimethyl glyoxime and Schiff base ligands).		
Unit-III	Transport and storage of metals	Transport and storage of metals: The transport mechanism, transport of alkali and alkaline earth metals, ionophores, transport by neutral macrocycles and anionic carriers, sodium/potassium pump, transport and storage of Iron (Transferrin & Ferritin).	March IInd Week-March IVthWeek	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-IV	Inorganic compounds as therapeutic Agents	Inorganic compounds as therapeutic Agents: - Introduction • chelation therapy, synthetic metal	April	Each topic will be explained by conventional

		chelates as antimicrobial agents, antiarthritis drugs, antitumor, anticancer drugs (Platinum complexes), Lithium and mental health.		method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-V	Nitrogen fixation	Nitrogen fixation: A. Nitrogen molecule (MO picture) and its transition metal complexes, reactivity of coordinated dinitrogen, in-vivo and in-vitro nitrogen fixation, symbiotic and asymbiotic nitrogen fixation. B. Nitrogen metabolism : Introduction, elementary idea about nitrogen nutrition in various forms (nitrate and ammonia nitrogen).	**May**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Practical Classes will be held Simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

17 Dr. Kumari Bandna

Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IVth Semester

Title: Inorganic Chemistry Special Theory -2
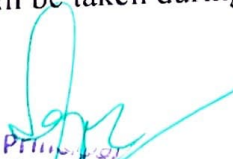
Course Code: CHEM 401

Section	Topic		Month	Remarks
Unit-1	Organometallic Compounds of transition elements	Types of ligands and their classifications in organometallic compounds , 16 and 18 electron rule and its limitations. Hapto-nomenclature, synthesis, structure and bonding aspects of following organometallic compounds with carbon- π donor ligands: (a) Two electron donor (olefin and acetylenic complexes of transition metals): (b) Three electron donor (π-allyl complexes of transition metals): (c) Four electron donor (butadiene and cyclobutadiene complexes of transition metals): (d) Five electron donor cyclopentadienyl complexes of transition	February	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

		metals – metallocenes with special emphasis to ferrocenes): (e) Six electron donor [Benzene (arene) complex]. Fluxional Organometallic compounds (classification)		
Unit-II	Homogeneous Transition metal catalysis	General considerations, Reason for selecting transition metals in catalysis (bonding ability, ligand effects, variability of oxidation state and coordination number), basic concept of catalysis (molecular activation by coordination and addition), proximity interaction (insertion/inter-ligand igration and elimination, rearrangement). Phase transfer catalysis. Homogeneous hydrogenation of unsaturated compounds (alkenes, alkynes, aldehydes and ketones). Asymmetric hydrogenation (Olefins)	**February 4th week- March 1st Week**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Some important homogeneous catalytic reactions	Ziegler Natta polymerization of ethylene and propylene, oligomerisation of alkenes by aluminumalkyl, Wackers acetaldehyde synthesis, hydroformylation of unsaturated compounds using cobalt and rhodium complexes, Monsanto	**March IInd Week- March IVth Week**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations

		acetic acid synthesis, carbonylation of alkenes and alkynes using nickel carbonyl and palladium complexes.		and daily class test will be given to students related to topics
Unit-IV	Metal-metal bonding in carbonyl and halide clusters	Polyhedral model of metal clusters, effect of electronic configuration and coordination number, Structures of metal carbonyl clusters of three atoms $M_3(CO)_{12}$ (M=Fe, Ru & Os), Four metal atoms (tetrahedra) [$M_4(CO)_{12}$ {M= Co, Rh &Ir}] and octahedron of type $M_6(CO)_{16}$ [M= Co & Rh], and halide derivatives of Rhenium (III) triangles, metal carbonyls involving bridged-terminal exchange and scrambling of CO group.	April	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-V	Transition Metal-Carbon multiple bonded compounds	Metal carbenes and carbines (preparation, reactions, structure and bonding considerations). Biological and industrial applications, and environmental aspects of organometallic compounds.	May	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students

			related to topics

Note: Practical Classes will be held Simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

1) Dr. Kumari Bandna

2 Anu (ANITA)

3 Pooja Kashyap

Principal
Govt. College Nalagarh
Distt. Solan (H.P.)

Department of Chemistry

Tentative Lesson Teaching Plan

M.Sc IVth Semester

Title: Inorganic Chemistry Special Theory -3

Course Code: CHEM 402

Section	Topic		Month	Remarks
Unit-1	Spectrophotometry	Introduction, fundamental laws of photometry, the electromagnetic spectrum and spectrochemical methods, UV/Visible instrumentation, absorption spectra, Beer-Lambert's Law, deviation from Beer-Lambert's Beer's Law. ii) Photometric Titrations:- Simultaneous spectrophotometric determination, differential spectrophotometry, titration curves and applications to quantitative analysis. iii) Molecular Fluorescence Spectroscopy:- Theory, relaxation processes, relationship between excitation spectra and	**February**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations , Daily Test will be given to students related to topics

		florescence spectra, florescencent species, effect of concentration on florescence intensity, instrumentation and application of florescence methods.		
Unit-II	Atomic Spectroscopy	Theory of flame photometer, intensities of spectral lines, selection of optimal working conditions, applications of flame photometry to quantitative analysis. The Theory of Atomic Absorption Spectroscopy (AAS), Origin of atomic spectra, line width effects in atomic absorption, instrumentation and its application, Atomic emission spectroscopy (AES) and the detailed description of the techniques of inductively coupled plasma AES (ICP-AES) and its instrumentation. Chemical and spectral interferences encountered in both techniques and how to overcome them.	**February 4th week- March 1st Week**	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily Class test will be given to students related to topics
Unit-III	Chromatographic methods	Introduction, terminology and basic principleclassification of chromatographic methods. Chromatographic behavior of solutes. Column efficiency and resolution. Instrumentation, columns,	**March IInd Week- March IVth Week**	Each topic will be explained by conventional method (Chalk and board) and power point

		solvent systems and detection methods and applications and comparison of Gas chromatography (GC) and High-Performance Liquid Chromatography (HPLC)		presentations. Assignments, presentations and daily class test will be given to students related to topics
Unit-IV	Polarographic Methods	General introduction: Theoretical measurements of classical polarography, polarographic measurements, polarograms, interpretation of polarographic waves, equation for polarographic waves, half-wave potential, effect of complex formation on polarographic waves, dropping mercury electrode (advantages and limitations), current variation with a dropping electrode, polarographic diffusion current, the ilkovic equation, effect of capillary characterization on diffusion current, diffusion coefficient temperature, kinetic and catalytic current, polarograms for mixtures of reactants, anodic waves and mixed anodic and cathodic waves, current maxima and its suppression, residual	April	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

		current, supporting electrolytes, oxygen waves, instrumentation and applications to inorganic and organic analysis.		
Unit-V	Thermoanalytical methods	(a) Thermogravimatric analysis: Introduction, Factors affecting thermogravimetric curves, Instrumentation, Applications to inorganic compounds (analysis of Ca and Mg in binary mixture, calcium oxalate, determination of Ca, Sr & Ba in the mixture, drying of sodium carbonate) and analysis of clays and soils, and determination of titanium content of non-stoichiometric sample of titanium carbide). (b) Differential thermal analysis: Introduction, Factors affecting DTA curves, Instrumentation, Applications to inorganic compounds: Mixtures of lanthanum-cerium and praseodymium oxalate, $CuSO_4.5H_2O$, detection of organic contamination in ammonium nitrate, different magnesium carbonate samples and determination of uncalcined gypsum in plaster of paris.	May	Each topic will be explained by conventional method (Chalk and board) and power point presentations. Assignments, presentations and daily class test will be given to students related to topics

Note: Practical Classes will be held Simultaneously at the end of each topic. Daily Class test and Mid Term test will be taken during the Session

1) (Pooja Kashyap)

2) (ANITA)

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Govt College Nalagarh

Annual Teaching Plan For Department Of Computer Science

First Year

1. COMP101TH: Problem Solving Using Computer

Unit I: Computer Fundamentals

Weeks 1-3: Introduction to Computers, Characteristics, Types and Generations

Weeks 4-6: Basic Computer Organization: CPU, ALU, memory hierarchy, registers, I/O devices

Unit II: Planning the Computer Program

Weeks 7-9: Problem definition, program design, debugging, types of errors, documentation

Weeks 10-12: Techniques: Flowcharting, decision tables, algorithms, structured programming

Unit III: Python Programming Basics

Weeks 13-15: Structure of Python program, Python shell, identifiers, keywords, literals, operators

Weeks 16-18: Control statements, loops, ifelse statements, break, continue, and pass

Unit IV: Data Structures and Advanced Python

Weeks 19-21: Numbers, Strings, Lists, Tuples, Dictionaries, Date & Time, Modules

Weeks 22-24: Advanced Python: Objects and Classes, Inheritance, Regular Expressions, GUI Programming

Lab (COMP101PR): Software Lab Using Python

Weeks 1-12: Basic Python Programs (temperature conversion, marks calculation, area calculations)

Weeks 13-24: Visual Python Programs (3D object creation, histograms, plotting graphs)

2. COMP102TH: Office Automation Tools

Unit I: Introduction to Office Tools

Weeks 25-27: Overview of Open Office, MS Office, Libre Office

Unit II: Word Processing

Weeks 28-30: Formatting text, pages, lists, and tables in word processors

Unit III: Spreadsheets

Weeks 31-33: Data formatting, charts, graphs, formulas, functions, macros, and pivot tables

Unit IV: Presentation Tools

Weeks 34-36: Adding and formatting text, pictures, graphic objects, slide shows, transitions, animations

Lab (COMP102PR): Office Automation Tools Lab

Weeks 25-36: Lab exercises covering Word Processing, Spreadsheets, and Presentation Tools

Second Year

3. COMP201TH: Computer System Architecture

Unit I: Digital Logic and Data Representation

Weeks 1-3: Logic gates, Boolean algebra, combinational circuits

Weeks 4-6: Number systems, complements, fixed/floating point representation, arithmetic

Unit II: Computer Organization and CPU Design

Weeks 7-9: Computer registers, bus system, instruction set, timing, and control

Weeks 10-12: Register organization, microoperations, stack organization, microprogrammed control

Unit III: Programming the Basic Computer

Weeks 13-15: Instruction formats, addressing modes, machine and assembly languages

Unit IV: Input Output Organization

Weeks 16-18: Peripheral devices, I/O interfaces, modes of data transfer, DMA

4. COMP202TH: Database Management System

Unit I: Introduction to DBMS

Weeks 19-21: Characteristics, data models, DBMS architecture, data independence

Unit II: Entity Relationship Modelling

Weeks 22-24: Entity types, relationships, schema definition, constraints, object modelling

Unit III: Relational Model and SQL

Weeks 25-27: Relational constraints, relational algebra, SQL queries

Unit IV: Database Design

Weeks 28-30: ER to relational mapping, functional dependencies, normalization

Lab (COMP202PR): Database Management System Lab

Weeks 19-30: Practical exercises using MySQL: DDL, DML commands, joins, nested queries, grouping

5. COMP203TH: PHP Programming

Unit I: PHP Basics

Weeks 31-33: PHP introduction, syntax, variables, operators, data types

Unit II: Forms and Control Structures

Weeks 34-36: Handling HTML forms, GET/POST methods, PHP loops, conditional statements

Unit III: Functions and Arrays in PHP

PHP Functions,- Arrays in PHP, Array Functions in PHP.

Unit IV: String Manipulation and Regular Expressions

String Functions in PHP, Regular Expressions in PHP, File Handling in PHP (Optional/Advanced Topic)

Third Year

6. COMP301TH: Operating System

Unit I: OS Fundamentals and Types

Weeks 1-3: OS strategies, types of OS, multiprogramming, batch, timesharing, Realtime systems

Unit II: OS Organization and Process Management

Weeks 4-6: OS design, system calls, process management, scheduling

Unit III: Memory Management

Weeks 7-9: Mapping address space, memory allocation strategies, paging, virtual memory

Unit IV: Shell Scripting

Weeks 10-12: Linux shell scripting, vi editor, writing and executing shell scripts, system calls

7. COMP302TH: Data Structure and File Processing

Unit I: Data Structures

Weeks 13-15: Stacks, queues, linked lists, binary trees, balanced trees

Unit II: Searching and Memory Management

Weeks 16-18: Internal and external searching, garbage collection, storage allocation

Unit III: File Systems and Physical Devices

Weeks 19-21: Storage devices, I/O buffering, file operations

Unit IV: File Organization and Indexing

Weeks 22-24: Sequential, indexed sequential, Btree, B+ tree

Lab (COMP302PR): Data Structure and File Processing Lab

Weeks 13-24: Practical programming in C++: implementing stacks, queues, linked lists, binary search

COMP307TH: Multimedia and Applications

Unit I: Introduction to Multimedia and Making Multimedia (Weeks 1–9)

1. **Weeks 1-3: Introduction to Multimedia**

Definition of multimedia, its components (text, images, audio, video, animation).

Uses and applications of multimedia in fields such as education, entertainment, business, and research.

2. **Weeks 4-6: Making Multimedia**

Stages of a multimedia project: concept development, design, production, testing, and distribution.

Essential requirements for quality multimedia, including planning and organization.

3. **Weeks 7-9: Multimedia Hardware and Authoring Tools**

Multimedia hardware: production platforms (Macintosh and Windows), hardware peripherals, memory, storage devices.

Introduction to multimedia authoring tools for creating interactive multimedia applications.

Unit II: Text and Images in Multimedia (Weeks 10–18)

1. Weeks 10-12: Text in Multimedia

Fonts and faces, text in multimedia design, font editing, and design tools.

Hypermedia and hypertext for creating interactive textbased content.

2. Weeks 13-15: Introduction to Images in Multimedia

Types of images (bitmap, vector), basics of 3D drawing and rendering.

Color concepts: natural light, computerized colors, color palettes, and image file formats.

3. Weeks 16-18: Advanced Image Techniques

Advanced image editing, rendering techniques, and 3D image creation.

Unit III: Sound and Video in Multimedia (Weeks 19–27)

1. Weeks 19-21: Sound in Multimedia

Digital audio basics, MIDI audio, comparison between MIDI and digital audio, audio file formats.

2. Weeks 22-24: Video Fundamentals

Understanding how video works, differences between analog and digital video.

3. Weeks 25-27: Video Shooting and Editing

Techniques for video shooting, basic video editing, and application of video effects.

Unit IV: Animation in Multimedia (Weeks 28–36)

1. Weeks 28-30: Principles of Animation

Key principles of animation: timing, easing, keyframing, and basic animation processes.

2. Weeks 31-33: Animation Techniques

Traditional and digital animation techniques, frame by frame animation, tweeting, and morphing.

3. Weeks 34-36: Animation File Formats and Exporting

Common animation file formats, exporting animations for web and video.

This plan allows for a structured and balanced approach, covering all theoretical and practical aspects outlined in the syllabus. Each course includes dedicated weeks for lectures, practical labs, and assessments, ensuring thorough coverage of the material.

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Lecture Plans of Mathematics for session 2023-2024

Title: Differential Calculus **Code: MATH101TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Limit and Continuity (epsilon and delta definition)	G.B. Thomas and R.L. Finney, Calculus, Spectrum, Sharma Publication	Lecture methods with demonstrations and images
August,2023	1st	Types of discontinuities		-do-
	2nd	Differentiability of functions		-do-
	3rd	Successive differentiation	,,	-do-
	4th	Leibnitz's theorem		-do-
September,2023	1st	Indeterminate forms		-do-
	2nd	-do-		Lecture methods with demonstrations
	3rd	Rolle's theorem	G.B. Thomas and R.L. Finney, Calculus	Lecture methods with demonstrations, images & animations
	4th	**Youth Festival Group-1**		-do-
October,2023	1st	Lagrange's & Cauchy Mean Value theorems	Spectrum, Sharma Publication	Lecture methods with demonstrations, images & animations
	2nd	Taylor's theorem with Lagrange's and Cauchy's forms of remainder	G.B. Thomas and R.L. Finney, Calculus	Lecture methods
	3rd	Taylor's series		-do-
	4th	Maclaurin's series of sin x, cos x		-do-
November,2023	1st	Maclaurin's series of e^x, $\log(1+x)$, $(1+x)^m$		-do-
	2nd	Concavity, Convexity & Points of	Spectrum, Sharma Publication	Lecture methods

Month	Week	Title	Reference	Teaching Method
	3rd	Inflexion		Lecture methods
		Curvature, Asymptotes, Singular points	G.B. Thomas and R.L. Finney, Calculus	Lecture methods
	4th	Parametric representation of curves and tracing of curves in parametric form		
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Polar co-ordinates and tracing of curves in polar co-ordinates	G.B. Thomas and R.L. Finney, Calculus	
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		Lecture methods with demonstrations, images & animations
	3rd	Functions of several variables (upto three variables): Limit and Continuity of these functions	Spectrum, Sharma Publication	Lecture methods
	4th	-do-		
March, 2024	1st	Partial differentiation, Euler's theorem on homogeneous functions	Spectrum, Sharma Publication	
	2nd	Maxima and Minima with Lagrange Multipliers Method,	Spectrum, Sharma Publication	Lecture methods
	3rd	Jacobian		Lecture methods
	4th	Problem Solving Sessions	Spectrum, Sharma Publication	Lecture methods with demonstrations, images & animations

Lecture Plans of Mathematics for session 2023-2024

Title: Differential Equations   **Code: MATH102TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	First order exact differential equations	Spectrum, Sharma Publication	Lecture methods with demonstrations
August,2023	1st	-do-	Spectrum, Sharma Publication	
	2nd	Integrating factors, rules to find an integrating factor		
	3rd	First order higher degree equations solvable for x, y, p.		
	4th	Methods for solving higher-order differential equations		Lecture methods with demonstrations, images & animations
September,2023	1st	Basic theory of linear differential equations		
	2nd	Wronskian, and its properties		
	3rd	Solving a differential equation by reducing its order	Spectrum, Sharma Publication	
	4th	Youth Festival Group-1		
October,2023	1st	Linear homogenous equations with constant coefficients	Spectrum, Sharma Publication	
	2nd	-do-		
	3rd	Linear non-homogenous equations		Lecture methods with demonstrations, images & animations
	4th	The method of variation of parameters		

Lecture Plans of Mathematics for session 2023-2024

Title: **Real Analysis**   **Code: MATH201TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
November,2023	1st	The Cauchy-Euler equation		
	2nd	Simultaneous differential equations, Total differential equations		
	3rd	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations	Spectrum, Sharma Publication	
	4th	Formation of first order partial differential equations(PDE)		
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Linear partial differential equation of first order, Lagrange's method	Spectrum, Sharma Publication	Lecture methods with demonstrations, images & animations
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only	Spectrum, Sharma Publication	Lecture methods with demonstrations, images & animations
	4th	-do-		
March, 2024	1st	Problem Solving Sessions		
	2nd	Problem Solving Sessions		
	3rd			
	4th			

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			

Month	Week	Topic	Reference	Teaching Method
	2nd			
	3rd			
August,2023	4th	Real line, bounded sets, suprema and infima		
	1st	-do-		
	2nd	completeness property of R, Archimedean property of R, intervals.	T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002	Lecture methods with demonstrations, images & animations
	3rd	Concept of cluster points and statement of Bolzano-Weierstrass theorem	Spectrum, Sharma Publication	
	4th	Real Sequence, Bounded sequence,	T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd., 2002	
September,2023	1st	Cauchy convergence criterion for sequences. Cauchy's theorem on limits	Spectrum, Sharma Publication	
	2nd	order preservation and squeeze theorem,		
	3rd	monotone sequences and their convergence (monotone convergence theorem without proof)	R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000	Lecture methods with demonstrations, images & animations
	4th	Youth Festival Group-1		
October,2023	1st	Infinite series		Lecture methods
	2nd	Cauchy convergence criterion for series, positive term series		
	3rd	geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series	R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000	Lecture methods
	4th	-do-		
November,2023	1st	Leibnitz's test (Tests of Convergence without proof).		
	2nd	Definition and examples of absolute and	Spectrum, Sharma	Lecture methods

Month	Week	Topic	Publication	Method
		conditional convergence.	Publication	
	3rd	-do-		
	4th	Sequences and series of functions, Pointwise and uniform convergence		Lecture methods
December, 2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Mn-test, M-test, Results about uniform convergence	K.A. Ross, *Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003*	
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	**Problem Solving Sessions**		
	3rd	Integrability and differentiability of functions (Statements only)	K.A. Ross, *Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag, 2003*	Lecture methods
	4th	Power series and radius of convergence.		
March, 2024	1st	**Problem Solving Sessions**		
	2nd	**Problem Solving Sessions**		Lecture methods
	3rd			
	4th			

Lecture Plans of Mathematics for session 2023-2024

Title: Algebra   Code: MATH202TH

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Definition and examples of groups, examples of abelian and non-abelian groups	Spectrum, Sharma Publication	Lecture methods
August,2023	1st	the group zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n		
	2nd	Cyclic groups from number systems, complex roots of unity, the general linear group GLn (n,R), groups of symmetries	Spectrum, Sharma Publication	Lecture methods
	3rd	permutation group Symmetry (n)		
	4th	Subgroups		
September,2023	1st	cyclic subgroups		-
	2nd	the concept of a subgroup generated by a subset and the commutator subgroup of group	Spectrum, Sharma Publication	Lecture methods
	3rd	examples of subgroups including the center of a group. Cosets, Index of subgroup	Spectrum, Sharma Publication	Lecture methods
	4th	**Youth Festival Group-1**		
October,2023	1st	Lagrange's theorem, order of an element		
	2nd	Normal subgroups: their definition, examples, and characterizations	Spectrum, Sharma Publication	
	3rd	Quotient groups		
	4th	Fundamental theorem of Homomorphism		
November,2023	1st	Fundamental theorem of Homomorphism		

Month	Week	Topic	Reference	Lecture methods
	2nd	Definition and examples of rings, examples of commutative and non-commutative rings	Spectrum, Sharma Publication	Lecture methods
	3rd	rings from number systems, Z_n the ring of integers modulo n		
	4th	Rings of matrices, polynomial rings,		
December, 2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Sub-rings and ideals		
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Sub-rings and ideals		
	4th	Integral domains and fields, examples of fields: Z_p, Q, R, and C		
March, 2024	1st	-do-		
	2nd	Problem Solving Sessions		
	3rd	Problem Solving Sessions		
	4th			

Lecture Plans of Mathematics for session 2023-2024

Code: MATH309TH

Title: Integral Calculus

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Integration by Partial fractions		Lecture methods
August,2023	1st	integration of rational and irrational functions		
	2nd	Properties of definite integrals		
	3rd	Reduction Formulae, $\int Sin^n x\, dx$, $\int Cos^n x\, dx$, $\int e^{ax} x^n dx,$		
	4th	$\int x^n (logx)^m dx$, $\int x^n Sinxdx$, $\int x^n cosxdx$, $\int Sin^n x\, Cos^n x dx$, , $\int^{\pi/2} Sin^n xdx$	G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005	
September,2023	1st	-do-	Spectrum, Sharma Publication	.
	2nd	$\int^{\pi/2} Cos^n xdx$, $\int^{\pi/2} Sin^n xCos^n xdx$. Reduction by connecting two integrals (Smaller Index.+ 1 Method). $\qquad 0$	G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005	Lecture methods
	3rd	-do-		
	4th	Youth Festival Group-1		
October,2023	1st	Areas and lengths of curves in the plane		Lecture methods and images
	2nd	Areas and lengths of curves in the plane		
	3rd	volumes and surfaces of solids of revolution		
	4th	volumes and surfaces of solids of revolution		Lecture methods and images

Month	Week	Topic	Reference	Method
November,2023	1st	volumes and surfaces of solids of revolution	G.B. Thomas and R.L. Finney, *Calculus*, 9th Ed., Pearson Education, Delhi, 2005	Lecture methods with demonstrations
	2nd	Double integrals		
	3rd	-do-		
	4th	Triple integrals		
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Problem Solving Sessions		
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Problem Solving Sessions		
	4th	Problem Solving Sessions		
March, 2024	1st	Problem Solving Sessions		
	2nd	Problem Solving Sessions		
	3rd			
	4th			

Lecture Plans of Mathematics for session 2023-2024

Title: Vector Calculus   **Code: MATH310TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Scalar and vector product of three vectors		Lecture methods
August,2023	1st	Product of four vectors. Reciprocal vectors	P.C. Matthew's, *Vector Calculus*, Springer Verlag London Limited, 1998	Lecture methods
	2nd	Vector differentiation, Scalar valued point functions, vector valued point functions	Spectrum, Sharma Publication	Lecture methods
	3rd	-do-		
	4th	Derivative along a curve, directional derivatives	P.C. Matthew's, *Vector Calculus*, Springer Verlag London Limited, 1998	Lecture methods with demonstrations
September,2023	1st	Gradient of a scalar point function	Spectrum, Sharma Publication	.
	2nd	Geometrical interpretation of gradient of a scalar point function (gradφ)	Spectrum, Sharma Publication	Lecture methods
	3rd	Divergence and curl of a vector point function. Character of divergence and curl of a vectorpoint function		
	4th	**Youth Festival Group-1**		
October,2023	1st	Character of divergence and curl of a vectorpoint function	P.C. Matthew's, *Vector Calculus*, Springer Verlag London Limited, 1998	Lecture methods with demonstrations
	2nd	Gradient, Divergence and Curl of sums and products and their related vector identities.	P.C. Matthew's, *Vector Calculus*, Springer Verlag	Lecture methods

Month	Week	Topic	Reference	Teaching Method
		Laplacian operator	London Limited, 1998	
	3rd	Fundamental triads of mutually orthogonal unit vectors	Spectrum, Sharma Publication	Lecture methods with demonstrations
	4th	Curl and Laplacian operators in terms of orthogonal curvilinear coordinators		Lecture methods
November, 2023	1st	Orthogonal curvilinear coordinates. Conditions for orthogonality	Spectrum, Sharma Publication	
	2nd	Cylindrical and Spherical coordinates: relation between Cartesian and cylindrical or spherical coordinates		
	3rd	-do-		
	4th	Vector integration: line integral, surface integral	P.C. Matthew's, *Vector Calculus*, Springer Verlag London Limited, 1998	Lecture methods
December, 2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th			
January, 2024	1st	Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Volume integrals		
	4th	Theorems of Gauss, Green and Stokes (without proof) and the problems based on these theorems	P.C. Matthew's, *Vector Calculus*, Springer Verlag London Limited, 1998	Lecture methods
March, 2024	1st	-do-		
	2nd	Problem Solving Sessions		
	3rd	Problem Solving Sessions		
	4th			

Lecture Plans of Mathematics for session 2023-2024

Title: Matrices   **Code: MATH301TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Types of matrices		Lecture methods
August,2023	1st	Rank of a matrix		Lecture methods with demonstrations
	2nd	Invariance of rank under elementary transformations	S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd.,New Delhi, 2004	Lecture methods
	3rd	Reduction to normal form		
	4th	Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto three	S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd.,New Delhi, 2004	Lecture methods with demonstrations
September,2023	1st	-do-		
	2nd	Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3	Spectrum, Sharma Publication	Lecture methods with demonstrations
	3rd	Computation of matrix inverses using elementary row operations. Rank of matrix.	S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd.,New Delhi, 2004	
	4th	**Youth Festival Group-1**		
October,2023	1st	Solutions of a system of linear equations using matrices	Spectrum, Sharma Publication	
	2nd	Illustrative examples of above concepts from	Spectrum, Sharma	

Month	Week	Topic	Book / Publication	Method
		Geometry, Physics,Chemistry, Combinatorics and Statistics	Publication	
	3rd	-do-		
	4th	Definition of Vector space, R, R², R³ as vector spaces over R	S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd.,New Delhi, 2004	
November,2023	1st	Concept of Linear dependence/ Independence		
	2nd	Standard basis for R, R², R³		
	3rd	Examples of different bases.Subspaces of R², R³	Spectrum, Sharma Publication	
	4th	Translation, Dilation, Rotation, Reflection in a point	S. H. Friedberg, A. L. Insel and L. E. Spence, *Linear Algebra*, Prentice Hall of India Pvt. Ltd.,New Delhi, 2004	Lecture methods with demonstrations
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	line and plane, Matrix form of basic geometric transformations.	Spectrum, Sharma Publication	
January, 2024	1st	Winter Vacations		
	2nd	Winter Vacations		
February,2024	1st	Problem Solving Sessions		
	2nd			
	3rd	Interpretation of eigenvalues and eigen vectors for such transformations	Spectrum, Sharma Publication	
	4th	eigen spaces as invariant subspaces		
March, 2024	1st	-do-	Spectrum, Sharma Publication	
	2nd	**Problem Solving Sessions**		
	3rd	**Problem Solving Sessions**		
	4th			

Lecture Plans of Mathematics for session 2023-2024

Title: Numerical Methods   Code: MATH304TH

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Algorithms, Convergence, Bisection method	M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007	Lecture methods with demonstrations
August,2023	1st	False position method, Fixed point iteration method	Spectrum, Sharma Publication	Lecture methods with demonstrations
	2nd	Newton's method		Lecture methods with demonstrations
	3rd	Secant method, LU decomposition	M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 5th Ed., New age International Publisher, India, 2007	Lecture methods with demonstrations
	4th	-do-		
September,2023	1st	Gauss-Jacobi, Gauss-Siedel methods	Spectrum, Sharma Publication	Lecture methods with demonstrations
	2nd	SOR iterative methods,		
	3rd	Lagrange and Newton interpolation:linear and higher order	M.K. Jain, S.R.K. Iyengar and R.K. Jain, *Numerical Methods for Scientific and Engineering*	Lecture methods with demonstrations

Month	Week	Topic	Reference	Teaching Method
			Computation, 5th Ed., New age International Publisher, India, 2007	
October, 2023	4th	Youth Festival Group-1		
	1st	Lagrange and Newton interpolation:linear and higher order	Spectrum, Sharma Publication	;
	2nd	Finite difference operators	Spectrum, Sharma Publication	
	3rd	Newton's forward difference		
	4th	Newton's backward difference method	Spectrum, Sharma Publication	
November, 2023	1st	Sterling's Central difference method		Lecture methods with demonstrations
	2nd	Numerical differentiation		
	3rd	Numerical differentiation		
	4th	Integration: Trapezoidal rule, Simpson's rule	M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and EngineeringComputation, 5th Ed., New age International Publisher, India, 2007	Lecture methods with demonstrations
December, 2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Integration: Trapezoidal rule, Simpson's rule	Spectrum, Sharma Publication	
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Integration: Trapezoidal rule, Simpson's rule		
	4th	-do-		
March, 2024	1st	Problem Solving Sessions		
	2nd	Problem Solving Sessions		
	3rd			
	4th			

Lecture Plans of Mathematics for session 2023-2024

Title: Probability and Statistics   Code: MATH313TH

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Sample space, probability axioms, real random variables (discrete and continuous),	Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to MathematicalStatistics*, Pearson Education, Asia, 2007	Lecture methods with demonstrations
August,2023	1st	-do-		
	2nd	-do-		
	3rd	cumulativedistribution function, probability mass/density functions	Spectrum, Sharma Publication	Lecture methods with demonstrations
	4th	-do-		
September,2023	1st	Mathematical expectation		
	2nd	moments, moment generating function,	Spectrum, Sharma Publication	
	3rd	characteristic function,discrete distributions: uniform	Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to MathematicalStatistics*, Pearson Education, Asia, 2007	Lecture methods with demonstrations

Month	Week	Topic	Textbook / Reference	Teaching Method
October,2023	4th	Youth Festival Group-1		
	1st	characteristic function, discrete distributions: uniform	Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to MathematicalStatistics*, Pearson Education, Asia, 2007	Lecture methods with demonstrations
	2nd	Binomial distribution		
	3rd	-do-		
	4th	Poisson distributions		
November,2023	1st	-do-		
	2nd	continuous distribution :normal	Spectrum, Sharma Publication	
	3rd	continuous distribution: exponential		
	4th	continuous distributions: uniform	Spectrum, Sharma Publication	
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	Joint cumulative distribution function and its properties	Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to MathematicalStatistics*, Pearson Education, Asia, 2007	Lecture methods with demonstrations
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	joint probability density functions, marginal and conditional distributions	Spectrum, Sharma Publication	
	4th	expectation of function of two random variables		
March, 2024	1st	conditional expectations, independent random variables	Robert V. Hogg, Joseph W. McKean and Allen T. Craig, *Introduction to MathematicalStatistics*,	

Lecture Plans of Mathematics for session 2023-2024

Title: Transportation and Game Theory   **Code: MATH317TH**

Month's Name	Week	Topics Name	Chapters/Section of text book/other reference	Pedagogy tool demonstration/images/animation etc.
July,2023	1st			
	2nd			
	3rd			
	4th	Transportation problem and its mathematical formulation	Hamdy A. Taha, *Operations Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006	Lecture methods with demonstrations
August,2023	1st	North west-corner method		Lecture methods with demonstrations
	2nd	Least cost method		Lecture methods with demonstrations
	3rd	-do-		
	4th	Vogel approximation method for determination of starting basic solution	Hamdy A. Taha, *Operations Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006	Lecture methods with demonstrations
September,2023	1st	-do-		
	2nd	algorithm for solving transportation problem	Spectrum, Sharma Publication	
	3rd	-do-		
	4th	Youth Festival Group-1		
October,2023	1st	Assignment problem and its	Hamdy A. Taha, *Operations*	Lecture methods

Month	Week	Topic	Reference	Method
		mathematical formulation	*Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006	with demonstrations
	2nd	-do-	Spectrum, Sharma Publication	
	3rd	Hungarian method for solving assignment problem		
	4th	-do-	Hamdy A. Taha, *Operations Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006	
November,2023	1st	Game theory: formulation of two person zero sum games,		Lecture methods with demonstrations
	2nd	Game theory: formulation of two person zero sum games,	Spectrum, Sharma Publication	
	3rd	solving two person zero sum games		
	4th	games with mixed strategies, graphical solution procedure	Spectrum, Sharma Publication	
December,2023	1st	MTT		
	2nd	MTT		
	3rd	MTT		
	4th	games with mixed strategies, graphical solution procedure	Hamdy A. Taha, *Operations Research, An Introduction*, 8th Ed., Prentice-Hall India, 2006	Lecture methods with demonstrations
January, 2024		Winter Vacations		
February, 2024	1st	Winter Vacations		
	2nd	Problem Solving Sessions		
	3rd	Hungarian method for solving assignment problem	Spectrum, Sharma Publication	
	4th	Problem Solving		
March, 2024	1st	Problem Solving Sessions		
	2nd	Problem Solving Sessions		

Dr.Jaswant Singh
Assistant Professor of Mathematics

Dr.Naresh Kumar
Assistant Professor of Mathematics

Department of Physics

Lesson Plan(Session 2023-24)

Name of the Course PHYSICS-DSC 1A: MECHANICS (Credits: Theory-04)

Code PHYS101TH

Unit-I

Ordinary Differential Equations: 1 st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. Coordinate systems and motion of a particle: Volume, velocity and acceleration in Cartesian and Spherical co-ordinate systems, Solid angle. Space Time Symmetry and Conservation Laws: Relationship of conservation laws and symmetries of space and time. Frames of Reference: Inertial frames of reference, Galilean transformation and Galilean invariance. Non-inertial frames, Coriolis force and its applications; Foucault"s pendulum.

Unit-II

Gravitation and Inverse Square Force Law: Newton's Law of Gravitation, Various forces in nature (qualitative). Central and non-central forces, Inverse square force, Centre of mass. Equivalent one body problem. Reduced mass, angular momentum in central force field. Equation of motion under a force law. Equation of orbit and turning points. relationship between eccentricity and energy, Kepler's laws., Basic idea of global positioning system (GPS).

Unit-III

Rotational Motion and Kinematics of Elastic and Inelastic Collisions: Angular velocity, angular momentum, Torque, Conservation of angular momentum,: Elastic and inelastic collisions, coefficient of restitution, Elastic collisions in laboratory and C.M. systems, Velocities, angle and energies in elastic collisions in C.M. and lab. Systems, Classical Scattering: Cross- section for elastic scattering, Rutherford scattering (with derivation).

Unit IV

Special Theory of Relativity: Concept of stationary universal frame of reference and search for ether. Michelson- Morley experiment, postulates of special

theory of relativity. Lorentz transformations. Observer in relativity. Relativity of simultaneity. (8 Lectures) Effects of Relativity: Length contraction. Time dilation. Relativistic addition of velocities. Relativistic Doppler effect. Variation of mass with velocity and mass energy equivalence. Increase of mass in an inelastic collision, Relativistic momentum and energies. Transformation of momentum, energy. Minkowsky space.

Reference Books:

• University Physics. FW Sears, MW Zemansky and HD Young13/e, 1986. Addison-Wesley

• Mechanics Berkeley Physics course,v.1: Charles Kittel, et. Al. 2007, Tata McGraw-Hill.

• Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley

• Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press

• University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

• Mechanics, D.S. Mathur, S. Chand and Company Ltd.

• An Introduction to Mechanics, Kleppner, Tata Macgraw Hill.

S.No	Month	Topic	No. of lectures	Methods
1.	Last week of July and August	Ordinary Differential Equations: 1 st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. Coordinate	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		systems and motion of a particle: Volume, velocity and acceleration in Cartesian and Spherical co-ordinate systems, Solid angle. Space Time Symmetry and Conservation Laws: Relationship of conservation laws and symmetries of space and time. Frames of Reference: Inertial frames of reference, Galilean transformation and Galilean invariance. Non-inertial frames, Coriolis force and its applications; Foucault's pendulum.		
		Special Theory of Relativity: Concept of stationary		

		universal frame of reference and search for ether. Michelson-Morley experiment, postulates of special theory of relativity. Lorentz transformations. Observer in relativity. Relativity of simultaneity. Effects of Relativity: Length contraction. Time dilation. Relativistic addition of velocities. Relativistic Doppler effect. Variation of mass with velocity and mass energy equivalence. Increase of mass in an inelastic collision, Relativistic momentum and energies.		

		Transformation of momentum, energy. Minkowsky space.			
3.	November	Gravitation and Inverse Square Force Law: Newton's Law of Gravitation, Various forces in nature (qualitative). Central and non-central forces, Inverse square force, Centre of mass. Equivalent one body problem. Reduced mass, angular momentum in central force field. Equation of motion under a force law. Equation of orbit and turning points. relationship between eccentricity and energy, Kepler's laws., Basic idea	15		Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		of global positioning system (GPS).		
4.	December and February	Rotational Motion and Kinematics of Elastic and Inelastic Collisions: Angular velocity, angular momentum, Torque, Conservation of angular momentum,: Elastic and inelastic collisions, coefficient of restitution, Elastic collisions in laboratory and C.M. systems, Velocities, angle and energies in elastic collisions in C.M. and lab. Systems, Classical Scattering: Cross- section for elastic scattering,	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		Rutherford scattering (with derivation).		

Name of the Course PHYSICS-DSC 1B: ELECTRICITY, MAGNETISM AND EMT.

Lesson Plan Session(2023-24)

Code PHYS102TH

Unit-I

Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem, Stokes's theorem, Green's theorem. Electrostatics: Significance of electrostatic force, Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor, electrostatic potential, electrostatic potential energy. Electric potential due to a dipole and quadrupole, long uniformly changed wire, charged disc. Electric potential energy. Electric field as a gradient of a scalar potential. Calculation of electric field due to a point charge and a dipole from potential. Method of Electrical Images. Poisson and Laplace equations. Electric Current and Fields of Moving charges: Current and current density. Continuity equation; $\nabla J + \partial\rho/\partial t = 0$. Microscopic form of Ohm's law ($J \alpha E$) and conductivity. Failure of Ohms law and its explanation. Invariance of charge.

Unit-II

Magnetism: Ampere circuital law and its applications. Hall Effect, Expression for Hall constant and its significance. Divergence and curl of magnetic field B. Vector potential: Definition of vector potential A and derivation. (5 Lectures) Field of Moving Charges: E in different frames of reference. Field of a point charge moving with constant velocity. Field of charge that starts or stops (qualitative). Interaction between moving charge and force between parallel currents. Surface current density: Definition. and its use in calculation of

change in magnetic field at a current sheet. Transformation equations of E and B from one frame of reference to another. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, displacement vector D, molecular interpretation of Claussius - Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics, illustration through a simple example.

Unit-III Electrostatic Fields in Dielectrics: Polarization of matter. Atomic and molecular dipoles, induced. Dipole moment and atomic polarizability. Electric susceptibility and polarization vector. Capacity of a capacitor filled with Dielectrics. Dielectrics and Gauss's law Displacement vector. Establishment of relation $\nabla.D = \rho$ free . Energy stored in a dielectric medium. Magnetic Fields in Matter: Behavior of various substances in magnetic fields. Definition of M and H and their relation to free and bound currents. Magnetic permeability and susceptibility and their interrelation. Orbital motion of electrons and diamagnetism. Electron spin and paramagnetic. Ferromagnetism. Domain theory of ferromagnetism, magnetization curve, hysterics loss, ferrites.

Unit-IV

Maxwell`s equations and Electromagnetic wave propagation: Displacement current, Maxwell's equations and its physical interpretation, EM waves and wave equation in a medium having finite permeability and permittivity but with conductivity $\sigma = 0$. Poynting vector, Poynting theorem, Impedance of a dielectric to EM waves, EM waves in conducting medium and skin depth. EM waves velocity in a conductor and anomalous dispersion. Reflection and Transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence of reflection of EM waves from the surface of a conductor at normal incidence.

Reference Books:

 • Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education..

 • Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford Univ. Press.

 • Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.

 • University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

• Introduction to Electrodynamics, D.J. Griffth, 3rd Edition, Prentice Hall of India.

• Electricity and Magnetism, Brij Lal and Subramanium, S. Chand & Co. Ltd.

• Electricity and Magnetism, A S Mahajan and A A Rangwala, Tata McGraw Hill Co.

S.No	Month	Topic	No. of lectures	Method
1.	Last week of July and August	Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem, Stokes's theorem, Green's theorem. Electrostatics: Significance of electrostatic force, Electrostatic Field, electric flux, Gauss's theorem of	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		electrostatics. Applications of Gauss theorem-Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor, electrostatic potential, electrostatic potential energy. Electric potential due to a dipole and quadrupole, long uniformly changed wire, charged disc. Electric potential energy. Electric field as a gradient of a scalar potential. Calculation of electric field due to a point charge and a dipole from potential. Method of Electrical Images. Poisson		

		and Laplace equations. Electric Current and Fields of Moving charges: Current and current density. Continuity equation; $\nabla J + \partial\rho/\partial t = 0$. Microscopic form of Ohm's law ($J \propto E$) and conductivity. Failure of Ohms law and its explanation. Invariance of charge.		
2.	September and October	Magnetism: Ampere circuital law and its applications. Hall Effect, Expression for Hall constant and its significance. Divergence and curl of magnetic field B. Vector potential: Definition of vector potential A and	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		derivation. Field of Moving Charges: E in different frames of reference. Field of a point charge moving with constant velocity. Field of charge that starts or stops (qualitative). Interaction between moving charge and force between parallel currents. Surface current density: Definition. and its use in calculation of change in magnetic field at a current sheet. Transformation equations of E and B from one frame of reference to another. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and		

		polarization vector, displacement vector D, molecular interpretation of Claussius - Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics, illustration through a simple example.		
3.	November	Electrostatic Fields in Dielectrics: Polarization of matter. Atomic and molecular dipoles, induced. Dipole moment and atomic polarizability. Electric susceptibility and polarization vector. Capacity of a capacitor	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		filled with Dielectrics. Dielectrics and Gauss's law Displacement vector. Establishment of relation $\nabla.D = \rho$ free . Energy stored in a dielectric medium. Magnetic Fields in Matter: Behavior of various substances in magnetic fields. Definition of M and H and their relation to free and bound currents. Magnetic permeability and susceptibility and their interrelation. Orbital motion of electrons and diamagnetism. Electron spin and paramagnetic. Ferromagnetism. Domain theory of		

		ferromagnetism, magnetization curve, hysterics loss, ferrites.		
4.	December and February	Maxwell`s equations and Electromagnetic wave propagation: Displacement current, Maxwell's equations and its physical interpretation, EM waves and wave equation in a medium having finite permeability and permittivity but with conductivity $\sigma = 0$. Poynting vector, Poynting theorem, Impedance of a dielectric to EM waves, EM waves in conducting medium and skin depth. EM waves velocity in a conductor and	15	Lecture Method through chalk and talk , slide presentation of various topics and providing e-resources.

		anomalous dispersion. Reflection and Transmission of EM waves at a boundary of two dielectric media for normal and oblique incidence of reflection of EM waves from the surface of a conductor at normal incidence.		

Department of Physics

Lesson Plan(Session 2023-2024)

Class –Bsc. 2nd year Course Code :- PHYS201TH   **Nomenclature:** STATISTICAL AND THERMAL PHYSICS

Syllabus

Unit-I Basic Ideas of Statistical Physics: Scope of statistical physics, basic ideas about probability, distribution of four distinguishable particles in two compartments of equal sizes. Concept of macro-states, micro-states, thermodynamic probability, effect of constraints on the system. Distribution of Particles in Compartments: Distribution of n particles in two compartments, Deviation from the state of maximum probability. Equilibrium state of a dynamic system, distribution of n distinguishable particles in k compartments of unequal sizes.

Unit-II Types of Statistics in Physics: Phase space and division into elementary cells. Three kinds of statistics. The basic approach in the three statistics. M-B. Statistics applied to an ideal gas in equilibrium, experimental verification of the Maxwell Boltzmann„s law of distribution of molecular speeds. Need for quantum statistics, h as a natural constant and its implications, indistinguishability of particles and its implications. B-E statistics, Bose Einstein and Fermi Dirac Statistics: Derivation of Planck"s law of radiation, deduction of Wien"s distribution law and Stefan"s law from plank"s law. Fermi-Dirac statistics. Applications to liquid helium, free electrons gas (Fermi level and Fermi Energy), Comparison of M-B, B-E, F-D statistics

Unit-III Entropy and Laws of Thermodynamics: Application of thermodynamics to the thermoelectric effect, change of entropy along a reversible path in a p-v diagram, entropy of a perfect gas, equation of state of ideal gas from simple statistical considerations, heat death of the universe. Statistical Interpretation of entropy: Statistical definition of entropy, change of entropy of system, additive nature of entropy, law of increase of entropy. Reversible and irreversible processes, example of reversible and irreversible processes. Work done in a reversible process, example of entropy in natural process, entropy and disorder.

Unit-IV Maxwell's Thermodynamic Relations and Their Applications: Thermodynamic Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Derivation of Maxwell"s thermodynamic relations.

Applications of thermodynamics relations. Cooling produced by adiabatic stretching, adiabatic compression, adiabatic Stretching of a wire, stretching of thin films, change of internal energy with volume. Clausius-Clapeyron Equation, Thermo dynamical treatment of JouleThomson effect for liquification of Helium. Production of very low temperatures by adiabatic demagnetization, TdS equations.

Reference Books: • Statistical Physics and Thermodynamics, V.S. Bhatia, Sohan Lal Nagin Chand & Co, 1986, Jalandhar. • Statistical Mechanics, R.K. Patharia, 2nd Edition, Butterworth-Heinemann. • Introduction to Statistical Mechanics,

B. B. Laud,(1988), Macmillan India Limited • Statistical Physics, Berkley Physics Course, Vol. 5, F. Rief, Mc-Graw Hill Book Company. • Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1993, Tata McGraw-Hill. • Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications. • Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988, Narosa • University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole. • Thermal and Statstical Physics, Brij Lal and Subrahmanyam, S. Chand & Co. Ltd. • Introduction to Statistical Mechanics, B. B. Laud,(1988), Macmillan India Limited • Statistical Physics, Berkley Physics Course, Vol. 5, F. Rief, Mc-Graw Hill Book Company.

Sno	Month	Topic	No. Of Lectures	Methods
1	Last week of July and August	Basic Ideas of Statistical Physics: Scope of statistical physics, basic ideas about probability, distribution of four distinguishable particles in two compartments of equal sizes. Concept of macro-states, micro-states, thermodynamic probability, effect of constraints on the system. Distribution of Particles in Compartments: Distribution of n particles in two compartments, Deviation from the state of maximum probability. Equilibrium state of a dynamic system, distribution of n distinguishable particles in k compartments of unequal sizes.	16	Lecture Method through chalk & talk , slide presentation of various topics and providing e-resources
2	September	Types of Statistics in Physics: Phase space and division into elementary cells. Three kinds	16	------do----------

		of statistics. The basic approach in the three statistics. M-B. Statistics applied to an ideal gas in equilibrium, experimental verification of the Maxwell Boltzmann„s law of distribution of molecular speeds. Need for quantum statistics, h as a natural constant and its implications, indistinguishability of particles and its implications. B-E statistics, (8 Lectures) Bose Einstein and Fermi Dirac Statistics: Derivation of Planck"s law of radiation, deduction of Wien"s distribution law and Stefan"s law from plank"s law. Fermi-Dirac statistics. Applications to liquid helium, free electrons gas (Fermi level and Fermi Energy), Comparison of M-B, B-E, F-D statistics.		
3	October	Entropy and Laws of Thermodynamics: Application of thermodynamics to the thermoelectric effect, change of entropy along a reversible path in a p-v diagram, entropy of a perfect gas, equation of state of ideal gas from simple statistical considerations, heat death of the universe.	07	------do----------

4.	November	Statistical Interpretation of entropy: Statistical definition of entropy, change of entropy of system, additive nature of entropy, law of increase of entropy. Reversible and irreversible processes, example of reversible and irreversible processes. Work done in a reversible process, example of entropy in natural process, entropy and disorder.	07	------do----------
5	December	Maxwell's Thermodynamic Relations and Their Applications: Thermodynamic Potentials: Enthalpy, Gibbs, Helmholtz and Internal Energy functions, Derivation of Maxwell"s thermodynamic relations	07	------do--------
6	February	Applications of thermodynamics relations. Cooling produced by adiabatic stretching, adiabatic compression, adiabatic Stretching of a wire, stretching of thin films, change of internal energy with volume. Clausius-Clapeyron Equation, Thermo dynamical treatment of JouleThomson effect for liquification of Helium. Production of very low temperatures by adiabatic demagnetization, TdS equations.	07	------do--------

Signature of Teacher

Department of Physics

Lesson Plan(Session 2023-2024)

Class –Bsc. 2ⁿᵈ year Course Code :- PHYS202TH   **Nomenclature:** WAVES AND OPTICS

<div align="center">

Syllabus

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Unit-I Simple harmonic motion: characteristics, graphical representation of SHM, phase relation between displacement, velocity and acceleration of a particle, executing SHM, SHM oscillator (mass attached to a spring placed on horizontal frictionless surface). energy of a simple harmonic oscillator. solution of the differential equation of SHM. Average kinetic energy, average potential energy and total energy. (7 Lectures)

Damped SHM: Damped oscillations. differential equation of motion of one dimensional damped harmonic mechanical oscillator. Types of damping. damped harmonic electric oscillator (differential equation and its solutions). Determination of the damping constants. Logarithmic decrement. Relaxation time. The quality factor, power dissipation in a damped harmonic oscillator when damping is weak. Relation between power dissipation energy and relaxation time of damped harmonic oscillator. (8 Lectures)

Unit-II The Forced Oscillator: Transient and steady behaviour of forced oscillator. Displacement and velocity variation with driving force frequency. Variation of phase with frequency. Power supplied to an oscillator and its variation with frequency. Q- value and band width. Q-value as an amplification factor (Phasor treatment to be followed). (4 Lectures)

Coupled Oscillators: Stiffness coupled pendulums. Normal co-ordinates and normal modes of vibration. Inductance coupling of electrical oscillators.

 (3 Lectures)

Wave Motion: The type of waves. The wave equation and its solution. Characteristic impedance of a string. Impedance matching. Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length. Energy of a vibrating string. Wave velocity and group velocity. (8 Lectures)

Unit-III Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. (3 Lectures)

 Interference: Division of wavefront and division of amplitude. Young"s Double Slit experiment. Lloyd"s Mirror and Fresnel"s Biprism. Phase change on reflection: Stokes" treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton"s Rings: measurement of wavelength and refractive index. Michelson"s Interferometer. (12 Lectures) 30

Unit-IV Diffraction: Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating, Dispersive power of diffraction grating, Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. (8 Lectures)

 Polarization: Transverse nature of light waves. Unpolarized and plane polarized light, production of polarized light, Wire grid polarizer, Polaroid, Effect of intensity of light passing through Polaroid, Malus" law, double refraction; ordinary ray and extraordinary ray, positive and negative crystals, birefringence, Nicol Prism, quarter wave plate and half wave plate, Polarization by reflection (Brewster law), polarization by scattering,. Circular and elliptical polarization, production of elliptically polarized and circularly polarized light. (7 Lectures)

Reference Books: • A text book of Optics, N. Subrahmanyam, B. Lal, M.N. Avadhanulu, S. Chand & Company Ltd. • Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill. • Principles of Optics, B.K. Mathur, 1995, Gopal Printing. • Fundamentals of Optics: Geometrical Physical and Quantum, D. R. Khanna, H. R. Gulati R. Chand Publication. • Optics, Eugene Hecht, Addison-Wesley 2002.

Sno	Month	Topic	No. Of Lectures	Methods
1	Last week of July and August	Simple harmonic motion: characteristics, graphical representation of SHM, phase relation between displacement, velocity and acceleration of a particle, executing SHM, SHM oscillator (mass attached to a spring placed on horizontal frictionless surface). energy of a simple harmonic oscillator. solution of the differential equation of SHM. Average kinetic energy, average potential energy and total energy. Damped SHM: Damped oscillations. differential equation of motion of one dimensional damped harmonic mechanical oscillator. Types of damping. damped harmonic electric oscillator (differential equation and its solutions). Determination of the damping constants. Logarithmic decrement. Relaxation time. The quality factor	16	Lecture Method through chalk & talk , slide presentation of various topics and providing e-resources
2	September	The Forced Oscillator: Transient and steady behaviour of forced oscillator. Displacement and velocity variation with driving force frequency. Variation of phase	16	------do----------

		with frequency. Power supplied to an oscillator and its variation with frequency. Q- value and band width. Q-value as an amplification factor (Phasor treatment to be followed). Coupled Oscillators: Stiffness coupled pendulums. Normal co-ordinates and normal modes of vibration. Inductance coupling of electrical oscillators.		
3	October	Wave Motion: The type of waves. The wave equation and its solution. Characteristic impedance of a string. Impedance matching. Reflection and transmission of energy. Reflected and transmitted energy coefficients. Standing waves on a string of fixed length. Energy of a vibrating string. Wave velocity and group velocity.	07	------do----------
4.	November	Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. (3 Lectures) Interference: Division of wavefront and division of amplitude. Young"s Double	07	------do---------- --

		Slit experiment. Lloyd"s Mirror and Fresnel"s Biprism. Phase change on reflection: Stokes" treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton"s Rings: measurement of wavelength and refractive index. Michelson"s Interferometer.		
5	December	IV Diffraction: Fraunhofer diffraction: Single slit; Double Slit. Multiple slits & Diffraction grating, Dispersive power of diffraction grating, Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.	07	------do--------
6	February	Polarization: Transverse nature of light waves. Unpolarized and plane polarized light, production of polarized light, Wire grid polarizer, Polaroid, Effect of intensity of light passing through Polaroid, Malus" law, double refraction; ordinary ray and extraordinary ray, positive and negative crystals,	07	------do--------

		birefringence, Nicol Prism, quarter wave plate and half wave plate, Polarization by reflection (Brewster law), polarization by scattering,. Circular and elliptical polarization, production of elliptically polarized and circularly polarized light.		

Signature of Teacher

Department of Physics

Lesson Plan(Session 2023-2024)

Class –Bsc. 2nd year Course Code :- PHYS203TH   **Nomenclature:** PHYSICS WORKSHOP SKILL

Syllabus

Introduction: Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains, etc.

Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal sheets, composites and alloy, wood. Concept of machine processing, introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file.

Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet.

Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.

Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism, Lifting of heavy weight using lever. braking systems, pulleys, working principle of power generation systems. Demonstration of pulley experiment.

Sno	Month	Topic	No. Of Lectures	Methods
1	Last week of July and August	Introduction: Measuring units. conversion to SI and CGS. Familiarization with meter scale, Vernier calliper, Screw gauge and their utility. Measure the dimension of a solid block, volume of cylindrical beaker/glass, diameter of a thin wire, thickness of metal sheet, etc. Use of Sextant to measure height of buildings, mountains,	04	Lecture Method through chalk & talk , slide presentation of various topics and providing e-resources
2	September	Mechanical Skill: Concept of workshop practice. Overview of manufacturing methods: casting, foundry, machining, forming and welding. Types of welding joints and welding defects. Common materials used for manufacturing like steel, copper, iron, metal	05	------do----------

		sheets, composites and alloy, wood. Concept of machine processing,		
3	October	introduction to common machine tools like lathe, shaper, drilling, milling and surface machines. Cutting tools, lubricating oils. Cutting of a metal sheet using blade. Smoothening of cutting edge of sheet using file. Drilling of holes of different diameter in metal sheet and wooden block. Use of bench vice and tools for fitting. Make funnel using metal sheet.	05	------do----------
4.	November	Electrical and Electronic Skill: Use of Multimeter. Soldering of electrical circuits having discrete components (R, L, C, diode) and ICs on PCB. Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.	05	------do----------
5	December	Operation of oscilloscope. Making regulated power supply. Timer circuit, Electronic switch using transistor and relay.	05	------do--------
6	February	Introduction to prime movers: Mechanism, gear system, wheel, Fixing of gears with motor axel. Lever mechanism,	06	------do--------

		Lifting of heavy weight using lever. braking systems, pulleys, working principle of power generation systems. Demonstration of pulley experiment.		

Signature of Teacher

Department of Physics

Lesson Plan(Session 2023-2024)

Class –Bsc. 2nd year Course Code :- PHYS205TH   **Nomenclature:** ELECTRICAL CIRCUITS AND NETWORK SKILLS

Syllabus

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter. Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. (4 Lectures)

Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop. (4 Lectures)

 Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. (3 Lectures) Electric Motors: Single-phase, three-phase & DC motors. Basic design.

Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor. (4 Lectures)

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources (3 Lectures)

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device) (4 Lectures)

Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board. (5 Lectures)

Reference Books: • A text book in Electrical Technology - B L Theraja - S Chand & Co. • A text book of Electrical Technology - A K Theraja • Performance and design of AC machines - M G Say ELBS Edn.

Sno	Month	Topic	No. Of Lectures	Methods
1	Last week of July and August	Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with multimeter, voltmeter and ammeter. Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and	05	Lecture Method through chalk & talk , slide presentation of various topics and providing e-resources

		three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money.		
2	September	Electrical Drawing and Symbols: Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop.	05	------do----------
3	October	Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. (3 Lectures) Electric Motors: Single-phase, three-phase & DC motors. Basic design. Interfacing DC or AC sources to control heaters & motors. Speed & power of ac motor.	05	------do----------
4.	November	Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources	05	------do---------- --

5	December	Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Interfacing DC or AC sources to control elements (relay protection device)	05	------do--------
6	February	Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board.	05	------do--------

Signature of Teacher

ANNUAL TEACHING PLANS

Session:2023-24

B.Sc. Ist Year

Name of Teacher: Ms. Vandana Sharma

ANIMAL DIVERSITY - CODE: ZOOL 101 TH

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Unit 1: Kingdom Protista General characters and classification up to classes; Locomotory Organelles and locomotion in Protozoa	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Unit 2: Phylum Porifera General characters and classification up to classes; Canal System in Sycon			Task completed
3.	07.08.2023 to 12.08.2023	Unit 3: Phylum Cnidaria General characters and classification up to classes; Polymorphism in Hydrozoa	,,		Task completed
4.	14.08.2023 to 19.08.2023	Unit 4: Phylum Platyhelminthes General characters and classification up to classes; Life history of Taenia solium Unit 5: Phylum Nemathelminthes General characters and classification up to classes; Life history of Ascaris lumbricoides and its parasitic adaptations			Task completed
5	21.08.2023 to 26.08.2023	Unit 6: Phylum Annelida General characters and classification up to classes; Metamerism in Annelida	,,		Task completed
6	28.08.2023 to 02.09.2023	Unit 7: Phylum Arthropoda General characters and classification up to classes;			Task completed

		Vision in Arthropoda, Metamorphosis in Insects			
7	**04.09.2023 to 09.09.2023**	Unit 8: Phylum Mollusca General characters and classification up to classes; Torsion in gastropods	,,		Task completed
8	**11.09.2023 to 16.09.2023**	Unit 9: Phylum Echinodermata General characters and classification up to classes; Water-vascular system in Asteroidea			Task completed
9	**18.09.2023 to 23.09.2023**	Unit 10: Protochordates General features and Phylogeny of Protochordata	,,		Task completed
10	**25.09.2023 to 30.09.2023**	Unit 11: Agnatha General features of Agnatha and classification of cyclostomes up to classes	,,		Task completed
11	**02.10.2023 to 07.10.2023**	Unit 12: Pisces 4 General features and Classification up to orders; Osmoregulation in Fishes			Task completed
12	**09.10.2023 to 14.10.2023**	Unit 13: Amphibia General features and Classification up to orders; Parental care	,,		Task completed
13	**16.10.2023 to 21.10.2023**	Unit 14: Reptiles General features and Classification up to orders; Poisonous and non-poisonous snakes, Biting mechanism in snakes			Task completed
14	**11.09.2023 to 16.09.2023**	Unit 15: Aves General features and Classification up to orders; Flight adaptations in birds	,,		Task completed
15	**23.10.2023 to 28.10.2023**	Unit 17: Mammals Classification up to orders; Origin of mammals	,,		Task completed
16	**30.10.2023 to 04.11.2023**	Pending topics if any	,,		Task completed
17			**Diwali vacations**		**Diwali**

					vacations
18	**06.11.2023 to 11.11.2023**	Pending topics if any			Task completed
19	**13.11.2023 to 18.11.2023**	Pending topics if any	"		Task completed
20	**20.11.2023 to 25.11.2023**	Pending topics if any	"		Task completed
21	**27.11.2023 to 02.12.2023**		"		**Mid Term Exam, revision & preparation**
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	----------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	----------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any			
25	**25.12.2023 to 30.12.2023**	Pending topics if any	"	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

Session:2023-24

B.Sc. Ist Year

Name of Teacher: Ms. Vandana Sharma

COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES
Code: ZOOL 102

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Unit 1: Integumentary System Derivatives of integument w.r.t. glands and digital tips	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Unit 2: Skeletal System Evolution of visceral arches			Task completed
3.	07.08.2023 to 12.08.2023	Unit 3: Digestive System Brief account of alimentary canal and digestive glands	,,		Task completed
4.	14.08.2023 to 19.08.2023	Unit 4: Respiratory System Brief account of Gills, lungs, air sacs and swim bladder			Task completed
5	21.08.2023 to 26.08.2023	Unit 5: Circulatory System Evolution of heart and aortic arches	,,		Task completed
6	28.08.2023 to 02.09.2023	Unit 6: Urinogenital System Succession of kidney, Evolution of urinogenital ducts			Task completed
7	04.09.2023 to 09.09.2023	Unit 7: Nervous System Comparative account of brain Unit 8: Sense Organs Types of receptors	,,		Task completed
8	11.09.2023 to 16.09.2023	vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development			Task completed

		of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula);types of morphogenetic movements; Fate of germ layers;			
9	**18.09.2023 to 23.09.2023**	Unit 9: Early Embryonic Development Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy;	,,		Task completed
10	**25.09.2023 to 30.09.2023**	Early development of frog (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula);types of morphogenetic movements; Fate of germ layers;	,,		Task completed
11	**02.10.2023 to 07.10.2023**	Early development of humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula);types of morphogenetic movements; Fate of germ layers;			Task completed
12	**09.10.2023 to 14.10.2023**	Unit 10: Late Embryonic Development Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology;	,,		Task completed
13	**16.10.2023 to 21.10.2023**	Metamorphic events in frog life cycle and its hormonal regulation.			Task completed
14	**11.09.2023 to 16.09.2023**		,,		Task completed
15	**23.10.2023 to 28.10.2023**	Unit 11: Control of Development Intercellular communication, cell movements and cell death.	,,		Task completed
16	**30.10.2023 to 04.11.2023**		,,		Task completed

17			**Diwali vacations**		**Diwali vacations**
18	**06.11.2023 to 11.11.2023**				Task completed
19	**13.11.2023 to 18.11.2023**		,,		Task completed
20	**20.11.2023 to 25.11.2023**	Pending topics if any	,,		Task completed
21	**27.11.2023 to 02.12.2023**		,,		**Mid Term Exam, revision & preparation**
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	----------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	----------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any			
25	**25.12.2023 to 30.12.2023**	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

Session:2023-24

B.Sc. IInd Year

Teachers Name: Dr. Harvinder Singh

DSC IC PHYSIOLOGY AND BIOCHEMISTRY   **Code: ZOOL 201 TH**

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
3.	24.07.2023 to 29.07.2023	Structure of a neuron, Resting membrane potential, Graded potential, myelinated and non-myelinated nerve fibres	Blackboard teaching assisted by use of 3D images on Epson Projector.	**Practical**-Study of permanent slides of spinal cord	Task completed
4.	31.07.2023 to 05.08.2023	Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres			Task completed
3.	07.08.2023 to 12.08.2023	Ultrastructure of skeletal muscle,	,,	**Practical**-Study of permanent slides of bone and cartilage.	Task completed
4.	14.08.2023 to 19.08.2023	Molecular and chemical basis of muscle contraction			Task completed
5	21.08.2023 to 26.08.2023	Physiology of digestion in the alimentary canal;	,,	**Practical**-Study of permanent slides of duodenum, Study of activity of salivary amylase under optimum conditions	Task completed
6	28.08.2023 to 02.09.2023	Absorption of carbohydrates, proteins, lipids			Task completed
7	04.09.2023 to 09.09.2023	Pulmonary ventilation, Respiratory volumes and capacities,	,,	**Practical**-Study of permanent slides of lung.	Task completed
8	11.09.2023 to 16.09.2023	Transport of Oxygen and carbon dioxide in blood			Task completed
9	18.09.2023 to 23.09.2023	Structure of nephron, Mechanism of Urine formation, Counter-current	,,	**Practical**-Study of permanent slides of kidney.	Task completed

		Mechanism			
10	**25.09.2023 to 30.09.2023**	Cardiovascular system Composition of blood, Hemostasis,	,,	**Practical-** Preparation of hemin and hemochromogen crystals	Task completed
11	**02.10.2023 to 07.10.2023**	Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle.			Task completed
12	**09.10.2023 to 14.10.2023**	Physiology of male reproduction: hormonal control of spermatogenesis;	,,		Task completed
13	**16.10.2023 to 21.10.2023**	Physiology of female reproduction: hormonal control of menstrual cycle			Task completed
14	**11.09.2023 to 16.09.2023**	Structure and function of pituitary, thyroid, Parathyroid, pancreas and adrenal	,,	**Practical-** Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland	Task completed
15	**23.10.2023 to 28.10.2023**	Carbohydrate Metabolism Glycolysis, Gluconeogenesis, Glycogen metabolism	,,	**Practical-** Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose).	Task completed
16	**30.10.2023 to 04.11.2023**	Krebs Cycle, Pentose phosphate pathway,	,,		Task completed
17			**Diwali vacations**		**Diwali vacations**
18	**06.11.2023 to 11.11.2023**	Review of electron transport chain			Task completed
19	**13.11.2023 to 18.11.2023**	β oxidation of palmitic acid ,	,,		Task completed
20	**20.11.2023 to 25.11.2023**	Protein metabolism Transamination, Deamination and Urea Cycle	,,	**Practical-** Estimation of total protein in given solutions by Lowry's method.	Task completed
21	**27.11.2023 to**	Enzymes			**Not**

	02.12.2023	Introduction, Mechanism of action, Inhibition and Regulation	,,		**completed due to** Mid Term Exam, revision & preparation
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	----------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	----------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any			
25	**25.12.2023 to 30.12.2023**	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

Session:2023-24

B.Sc. IInd Year

GENETICS AND EVOLUTIONARY BIOLOGY   **CODE: ZOOL 201 TH**

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Introduction to Genetics Mendel's work on transmission of traits, Genetic Variation, Molecular basis of Genetic Information	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Mendelian Genetics and its Extension Principles of Inheritance, Chromosome theory of inheritance.		**Practical-** Study of Mendelian Inheritance and gene interactions (Non Mendelian Inheritance) using suitable examples. Verify the results using Chi-square test.	Task completed
3.	07.08.2023 to 12.08.2023	Incomplete dominance and co-dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy,	,,		Task completed
4.	14.08.2023 to 19.08.2023	Sex linked inheritance, extra-chromosomal inheritance			Task completed
5	21.08.2023 to 26.08.2023	Linkage, Crossing Over and Chromosomal Mapping	,,	**Practical-** Study of Linkage, recombination, gene mapping using the data	Task completed
6	28.08.2023 to 02.09.2023	Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy		.	Task completed
7	04.09.2023 to 09.09.2023	Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations	,,		Task completed
8	11.09.2023	Sex Determination		**Practical-** Study of	Task

	to 16.09.2023	Chromosomal mechanisms, dosage compensation		Human Karyotypes (normal and abnormal).	completed
9	18.09.2023 to 23.09.2023	History of Life Major Events in History of Life Introduction to Evolutionary Theories Lamarckism,	,,		Task completed
10	25.09.2023 to 30.09.2023	Darwinism, Neo-Darwinism	,,		Task completed
11	02.10.2023 to 07.10.2023	Types of fossils, Incompleteness of fossil record,		**Practical-** Study of fossil evidences from plaster cast models and pictures Study of homology and analogy from suitable specimens/ pictures	Task completed
12	09.10.2023 to 14.10.2023	Dating of fossils, Phylogeny of horse	,,		Task completed
13	16.10.2023 to 21.10.2023	Processes of Evolutionary Change Organic variations; Isolating Mechanisms;			Task completed
14	11.09.2023 to 16.09.2023	Species Concept Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric)	,,		Task completed
15	23.10.2023 to 28.10.2023	Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection	,,		Task completed
16	30.10.2023 to 04.11.2023	Macro-evolution Macro-evolutionary Principles (example: Darwin's Finches) Extinction-	,,	**Practical-** Darwin's Finches with diagrams/ cut outs of beaks of different species	Task completed
17			**Diwali vacations**		**Diwali vacations**
18	06.11.2023 to 11.11.2023	Mass extinction (Causes, Names of five major extinctions), Role of extinction in evolution			Task completed

19	**13.11.2023 to 18.11.2023**	Pending topics if any	,,		Task completed
20	**20.11.2023 to 25.11.2023**	Pending topics if any	,,		Task completed
21	**27.11.2023 to 02.12.2023**		,,		Mid Term Exam, revision & preparation
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	---------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	---------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any		Revision, class tests, quizzes, seminars etc.	Task completed
25	**25.12.2023 to 30.12.2023**	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

Session:2023-24

B.Sc. IInd Year

MEDICAL DIAGNOSTICS   CODE: ZOOL 203 TH &

APICULTURE   CODE: ZOOL 204 TH

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Unit 1: Introduction to Medical Diagnostics and its Importance	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Unit 2: Diagnostics Methods Used for Analysis of Blood Blood composition,			Task completed
3.	07.08.2023 to 12.08.2023	Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain,	„	Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer,	Task completed
4.	14.08.2023 to 19.08.2023	Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)			Task completed
5	21.08.2023 to 26.08.2023	Unit 3: Diagnostic Methods Used for Urine Analysis Urine Analysis: Physical characteristics; Abnormal constituents	„		Task completed
6	28.08.2023 to 02.09.2023	Unit 4:Non -infectious Diseases Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Testing of blood glucose using Glucometer/Kit		Testing of blood glucose using Glucometer/Kit	Task completed
7	04.09.2023 to 09.09.2023	Unit 4:Non -infectious Diseases Causes, types, symptoms, complications, diagnosis and prevention of Hypertension (Primary and secondary.	„		Task completed
8	11.09.2023 to	Unit 5: Infectious Diseases Causes, types, symptoms,			Task completed

	16.09.2023	diagnosis and prevention of Tuberculosis			
9	18.09.2023 to 23.09.2023	Unit 5: Infectious Diseases Causes, types, symptoms, diagnosis and prevention of Hepatitis	,,		Task completed
10	25.09.2023 to 30.09.2023	Unit 6: Tumours Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).	,,		Task completed
11	02.10.2023 to 07.10.2023	Unit 1: Biology of Bees History, Classification and Biology of Honey Bees			Task completed
12	09.10.2023 to 14.10.2023	Social Organization of Bee Colony	,,		Task completed
13	16.10.2023 to 21.10.2023	Unit 2: Rearing of Bees Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth			Task completed
14	11.09.2023 to 16.09.2023	Bee Pasturage Selection of Bee Species for Apiculture Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern)	,,		Task completed
15	23.10.2023 to 28.10.2023	Unit 3: Diseases and Enemies Bee Diseases and Enemies Control and Preventive measures	,,		Task completed
16	30.10.2023 to 04.11.2023	Unit 3: Diseases and Enemies Bee Diseases and Enemies Control and Preventive measures	,,		Task completed
17			**Diwali vacations**		**Diwali vacations**
18	06.11.2023 to 11.11.2023	Unit 4: Bee Economy Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen Etc			Task completed
19	13.11.2023 to 18.11.2023	Unit 5: Entrepreneurship in Apiculture Bee Keeping	,,		Task completed

		Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens			
20	**20.11.2023 to 25.11.2023**	Pending topics if any	,,		Task completed
21	**27.11.2023 to 02.12.2023**	Pending topics if any	,,		Mid Term Exam, revision & preparation
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	----------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	----------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any		Revision, class tests, quizzes, seminars etc.	Task completed
25	**25.12.2023 to 30.12.2023**	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

B.Sc. IIIrd Year

Teacher's Name: Dr. Anuj Kumar Sawhney

ANIMAL BIOTECHNOLGY   ZOOL 302 (A)

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
5.	24.07.2023 to 29.07.2023	Unit 1: Introduction Concept and scope of biotechnology	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
6.	31.07.2023 to 05.08.2023	Unit 2: Molecular Techniques in Gene manipulation Cloning vectors: Plasmids, Cosmids,			Task completed
3.	07.08.2023 to 12.08.2023	Unit 2: Molecular Techniques in Gene manipulation Cloning vectors: Phagemids, Lambda	,,		Task completed
4.	14.08.2023 to 19.08.2023	Unit 2: Molecular Techniques in Gene manipulation Cloning vectors: Bacteriophage, M13.			Task completed
5	21.08.2023 to 26.08.2023	Unit 2: Molecular Techniques in Gene manipulation Cloning vectors: BAC, YAC,	,,		Task completed
6	28.08.2023 to 02.09.2023	MAC and Expression vectors (characteristics)			Task completed
7	04.09.2023 to 09.09.2023	Restriction enzymes: Nomenclature, detailed study of Type II Transformation techniques: Calcium chloride method and electroporation.	,,		Task completed
8	11.09.2023 to 16.09.2023	Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern,			Task completed
9	18.09.2023 to 23.09.2023	Northern and Western blotting; DNA sequencing: Sanger method	,,		Task completed
10	25.09.2023 to 30.09.2023	Polymerase Chain Reaction, DNA Finger Printing and DNA micro array	,,		Task completed
11	02.10.2023 to	Unit 3: Genetically Modified			Task

	07.10.2023	Organisms Production of cloned and transgenic animals:			completed
12	09.10.2023 to 14.10.2023	Nuclear Transplantation, Retroviral Method, DNA microinjection	,,		Task completed
13	16.10.2023 to 21.10.2023	Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice.			Task completed
14	11.09.2023 to 16.09.2023	Production of transgenic plants: Agrobacterium mediated transformation. Applications of transgenic plants: insect and herbicide resistant plants.	,,		Task completed
15	23.10.2023 to 28.10.2023	Unit 4: Culture Techniques and Applications Animal cell culture, Expressing cloned genes in mammalian cells,	,,		Task completed
16	30.10.2023 to 04.11.2023	Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)	,,		Task completed
17			**Diwali vacations**		**Diwali vacations**
18	06.11.2023 to 11.11.2023	Pending topics if any			Task completed
19	13.11.2023 to 18.11.2023	Pending topics if any	,,		Task completed
20	20.11.2023 to 25.11.2023		,,		Task completed
21	27.11.2023 to 02.12.2023		,,		Mid Term Exam, revision & preparation
22	04.12.2023 to 09.12.2023	------	**Mid Term Exam**	----------------	----------
23	12.02.2024 to 17.02.2024	------	**Mid Term Exam**	----------------	----------
24	18.12.2023 to 23.12.2023	Pending topics if any			
25	25.12.2023 to 30.12.2023	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	19.02.2024	Complete syllabus		Revision, class tests,	Task

	to 24.02.2024		„	quizzes, seminars etc.	completed
27	26.02.2024 to 02.03.2024	Complete syllabus	„	Revision, class tests, quizzes, seminars etc.	Task completed
28	04.03.2024 to 09.03.2024	Complete syllabus	„	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

B.Sc. IIIrd Year

DSE IB   REPRODUCTIVE BIOLOGY   Code: ZOOL 302(C)

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Unit 1: Reproductive Endocrinology Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins,	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Unit 1: hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female;			Task completed
3.	07.08.2023 to 12.08.2023	Unit 1: Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia, mechanism of sex differentiation.	,,		Task completed
4.	14.08.2023 to 19.08.2023	Unit 2: Functional anatomy of male reproduction outline and histological of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract			Task completed
5	21.08.2023 to 26.08.2023	Unit 2: Functional anatomy of male reproduction outline and histological of male reproductive system in rat and human; Testis: Cellular	,,		Task completed

		functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract			
6	**28.08.2023 to 02.09.2023**	Unit 2: Functional anatomy of male reproduction outline and histological of male reproductive system in rat and human; Testis: Cellular functions, germ cell, system cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract			Task completed
7	**04.09.2023 to 09.09.2023**	Unit 3: Functional anatomy of female reproduction Outline and histological of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship;	,,		Task completed

		Mechanism of parturition and its hormonal regulation; Lactation and its regulation			
8	**11.09.2023 to 16.09.2023**	Unit 3: Functional anatomy of female reproduction Outline and histological of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation			Task completed
9	**18.09.2023 to 23.09.2023**	Unit 3: Functional anatomy of female reproduction Outline and histological of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of	,,		Task completed

		implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation			
10	**25.09.2023 to 30.09.2023**	Unit 3: Functional anatomy of female reproduction Outline and histological of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation	„		Task completed
11	**02.10.2023 to 07.10.2023**	Unit 4: Reproductive Health Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning .			Task completed

12	**09.10.2023 to 14.10.2023**	Unit 4: Reproductive Health Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning .	,,		Task completed
13	**16.10.2023 to 21.10.2023**	Unit 4: Reproductive Health Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning .			Task completed
14	**11.09.2023 to 16.09.2023**	Unit 4: Reproductive Health Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning .	,,		Task completed
15	**23.10.2023 to 28.10.2023**		,,		Task completed

16	30.10.2023 to 04.11.2023		,,		Task completed
17			**Diwali vacations**		**Diwali vacations**
18	06.11.2023 to 11.11.2023	Pending topics if any			Task completed
19	13.11.2023 to 18.11.2023	Pending topics if any	,,		Task completed
20	20.11.2023 to 25.11.2023		,,		Task completed
21	27.11.2023 to 02.12.2023		,,		Mid Term Exam, revision & preparation
22	04.12.2023 to 09.12.2023	------	**Mid Term Exam**	----------------	----------
23	12.02.2024 to 17.02.2024	------	**Mid Term Exam**	----------------	----------
24	18.12.2023 to 23.12.2023	Pending topics if any			
25	25.12.2023 to 30.12.2023	Pending topics if any	,,	Revision, class tests, quizzes, seminars etc.	Task completed
26	19.02.2024 to 24.02.2024	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
27	26.02.2024 to 02.03.2024	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed
28	04.03.2024 to 09.03.2024	Complete syllabus	,,	Revision, class tests, quizzes, seminars etc.	Task completed

ANNUAL TEACHING PLANS

B.Sc. IIIrd Year

S.No.	Schedule	Topic	Instructional Procedure	Homework/ Assignment/ Practical etc.	Remarks
1.	24.07.2023 to 29.07.2023	Unit 1: Introduction Sericulture: Definition, history and present status; Silk route	Blackboard teaching assisted by use of 3D images on Epson Projector.		Task completed
2.	31.07.2023 to 05.08.2023	Unit 1: Types of silkworms, Distribution and Races			Task completed
3.	07.08.2023 to 12.08.2023	Exotic and indigenous races. Mulberry and non-mulberry Sericulture	,,		Task completed
4.	14.08.2023 to 19.08.2023	Unit 2: Biology of Life cycle of Bombyx mori Structure of silk gland and secretion of silk			Task completed
5	21.08.2023 to 26.08.2023	Unit 3: Rearing of Silkworms Selection of mulberry variety and establishment of mulberry garden Rearing house and rearing appliances	,,		Task completed
6	28.08.2023 to 02.09.2023	Disinfectants: Formalin, bleaching powder, RKO Silkworm rearing technology: Early age and Late age rearing Types of mountages Spinning, harvesting and storage of cocoons			Task completed
7	04.09.2023 to 09.09.2023	Unit 4: Pests and Diseases Pests of silkworm: Uzi fly, dermestid beetles and vertebrates	,,		Task completed
8	11.09.2023 to 16.09.2023	Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial Control and prevention of pests and diseases			Task completed
9	18.09.2023 to 23.09.2023	Unit 5: Entrepreneurship in Sericulture Prospectus of Sericulture in India:	,,		Task completed

		Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture.			
10	**25.09.2023 to 30.09.2023**	Unit1: Introduction to Aquarium Fish Keeping The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes	,,		Task completed
11	**02.10.2023 to 07.10.2023**	Unit 2: Biology of Aquarium Fishes common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish			Task completed
12	**09.10.2023 to 14.10.2023**	Unit 2: Biology of Aquarium Fishes common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish	,,		Task completed
13	**16.10.2023 to 21.10.2023**	Unit 3: Food and feeding of Aquarium fishes Use of live fish feed organisms. Preparation and composition of formulated fish feeds			Task completed
14	**11.09.2023 to 16.09.2023**	Unit 4: Fish Transportation Live fish transport - Fish handling, packing and forwarding techniques.	,,		Task completed
15	**23.10.2023 to 28.10.2023**	Unit 5: Maintenance of Aquarium General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry	,,		Task completed
16	**30.10.2023 to 04.11.2023**		,,		Task completed

17			**Diwali vacations**		**Diwali vacations**
18	**06.11.2023 to 11.11.2023**				Task completed
19	**13.11.2023 to 18.11.2023**		"		Task completed
20	**20.11.2023 to 25.11.2023**		"		Task completed
21	**27.11.2023 to 02.12.2023**		"		Mid Term Exam, revision & preparation
22	**04.12.2023 to 09.12.2023**	------	**Mid Term Exam**	----------------	----------
23	**12.02.2024 to 17.02.2024**	------	**Mid Term Exam**	----------------	----------
24	**18.12.2023 to 23.12.2023**	Pending topics if any			
25	**25.12.2023 to 30.12.2023**	Pending topics if any	"	Revision, class tests, quizzes, seminars etc.	Task completed
26	**19.02.2024 to 24.02.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed
27	**26.02.2024 to 02.03.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed
28	**04.03.2024 to 09.03.2024**	Complete syllabus	"	Revision, class tests, quizzes, seminars etc.	Task completed