

No.AC2(S)/35/2025-26

Dated: 07.07.2025

Notification

Sub:-Syllabus and Scheme of Examinations of Chemistry (UG)
Programme (III & IV Semester) from the Academic year 2025-26.

- Ref:-**1. Decision of Board of Studies in Chemistry (CB) meeting
held on 17-05-2025.
2. Decision of the Faculty of Science & Technology Meeting
held on 13-06-2025.
3. Decision of the Academic Council meeting held on
30-06-2025.

The Board of Studies in Chemistry (CB) which met on 17-05-2025 has resolved to recommend and approved the III & IV Semester Syllabus and Scheme of Examinations of Chemistry (UG) programme with effect from the Academic year 2025-26.

The Faculty of Science & Technology and Academic Council at their meetings held on 13-06-2025 and 30-06-2025 respectively has also approved the above said Syllabus and Scheme of Examinations, hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be download from the University Website www.uni-mysore.ac.in.


Registrar
Registrar
University of Mysore
Mysore

To:

1. All the Principals of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Chemistry, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Botany, MGM.
5. The Director, Directorate of Online Programme, Moulya Bhavan, Manasagangothri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council, Manasagangothri, Mysore.
8. The Director, ICD, MGM-Request to publish this Notification in university website.
9. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
10. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
11. Office Copy.

JSS MAHAVIDYAPEETHA



JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore)

Re-accredited by bNAAC with 'A' grade

Ooty Road Musuru, Mysuru-570 025

DEPARTMENT OF CHEMISTRY SYLLABUS

CHOICE BASED CREDIT SYSTEM

For B.Sc Programmes

(III & IV Semester)

Physics, Chemistry, Mathematics

Chemistry, Botany, Zoology

Chemistry, Zoology, Biotechnology

w.e.f. 2024-25

B.Sc.CHEMISTRY SYLLABUS THIRD SEMESTER**Paper:Chemistry-III****GCH 301****Code:CHSDSC-III TH**

Contact Hours/Week	Credits	Scheme of Evaluation:Max.Marks:100		
		Continuous Internal Assessment(CIA)		Semester End Examination(SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

PAPER:Chemistry-III**[48 Hours]****UNIT-I:InorganicChemistry****[16Hrs]****p- Block Elements**

Boron: Boron hydrides – Classification with examples. Diborane- preparation, structure, and nature of bonding.

Interhalogen Compounds: Definition, types with examples, general methods of preparation (by direct combination of halogen, from lower inter halogens) and properties (physical state, thermal stability, reactivity, and hydrolysis), Applications.

Noble gases: Chemical properties and applications of noble gases, chemistry of xenon, preparation, and structure of xenon compounds (XeF₂, XeF₄, XeF₆, XeO₃ and XeO₄). **[06Hrs]**

Chemistry of transition elements:Position in the periodic table, general characteristics, electronic configuration, atomic and ionic radii, ionization energy, variable oxidation states, spectral properties, redox potentials, color and magnetic properties, catalytic activity and complex formation. **[05 Hrs]**

Chemistry of Lanthanides and actinides: Electronic configuration, oxidation states, color, spectral, magnetic properties, catalytic activity and complex formation. Lanthanide contraction-Causes and consequences. Separation of Lanthanides by ion exchange method.

General features and chemistry of actinides,principles of separation of Neptunium,and Plutonium from uranium. Trans uranium elements. **[05 Hrs]**

UNIT-II:OrganicChemistry**[16Hrs]**

Alcohols: Definition and classification. **Monohydric alcohols:** Preparation of alcohols by Hydroboration-oxidation method. Hydration of alkenes. Distinction tests between 1°, 2°, and 3° alcohols by Victor Meyer and oxidation method. Conversion of 1° to 2°, 2° to 3° and 1° to 3° alcohols. Dehydration of 1°, 2°, 3° alcohols and comparison of their rates. **Dihydric alcohols:** Glycol – preparation from vicinal dihalides and uses.Pinacols–synthesis,mechanism of pinacol-pinacolone

rearrangement. **Trihydric alcohols:** Glycerol, synthesis from propene, reactions with HNO_3 , H_2SO_4 , oxalic acid and HI. Uses of glycerol. [05 Hrs]

Phenols: Definition, classification with examples, acidity of phenols, effect of substituents on acidity of phenols. Mechanism of Reimer-Tiemann reaction and Kolbe reaction. Fries and Claisen rearrangement with examples. Conversion of phenol to phenolphthalein. [05 Hrs]

Ethers: Nomenclature, Williamson ether synthesis, reactions – cleavage and auto-oxidation-Ziesel's method (estimation of $-\text{OCH}_3$). **Crownethers:** Introduction with examples, Applications as Phase transfer catalysts. [02 Hrs]

Carbonyl Compounds: Nomenclature, synthesis of aldehydes and ketones from alcohols. Distinction between aldehydes and ketones – oxidation and reduction method. Addition of alcohols- formation of hemiacetal and acetal. Condensation with NH_2OH and 2,4-DNP. Mechanism of aldol condensation, Perkins reaction, Cannizzaro reaction, Wolf-kishner and Clemmensen reduction. [04 Hrs]

UNIT-III: Physical Chemistry

[16 Hrs]

Thermodynamics

First law of thermodynamics: Statement and mathematical equation.

Second law of thermodynamics: Spontaneous and non-spontaneous processes – definition and examples. Definition and significances of entropy, variation of entropy with P, T and V (derivation). Criteria of spontaneity in terms of entropy change. Heat engine – Carnot cycle and efficiency of heat engine (derivation). Carnot's theorem and thermodynamic scale of temperature. Different statements of second law of thermodynamics (Numerical problems)

Free energy-Helmholtz and Gibb's free energy, Gibb's-Helmholtz equation at constant pressure and constant volume (derivation), thermodynamic criteria for spontaneity in terms of A and G. Variations of Helmholtz free energy with V and T, Variation of Gibb's free energy with P and T (derivation). Clausius-Clapeyron equation with differential form (derivation) and its applications in liquid-vapor equilibrium. Vant-Hoff's reaction isotherm-derivation and its applications. Nernst heat theorem and third law of thermodynamics. Calculation of absolute entropy of water (Problems).

Partial molar quantities: Introduction, partial molar volume and partial molar free energy (chemical potential)-definition and formulation of Gibb's-Duhem equation. [10 Hrs]

Phase equilibria: Definition of the terms- Phase, component and degree of freedom with examples. Statement of Gibb's phase rule and thermodynamic derivation. Applications-(a) one component system-water system (b) reduced phase rule and reduced system, two component system-Silver-lead system (eutectic type), desilverization of lead and $\text{FeCl}_3\text{-H}_2\text{O}$ system (congruent melting point)

Freezing mixtures: Definition and examples, Explanation based on KI-water system. (06 Hr)

PRACTICALS GCH 302**Paper: Chemistry Practical-III****Hours: 64****Code: CHSDSCP-III**

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 50		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

LIST OF EXPERIMENTS**PART-A: Semimicro Qualitative Analysis of Inorganic Salt Mixtures**

Systematic semimicro qualitative analysis of two anion and two cations in a given salt mixture. The constituent ions in the mixture to be restricted to the following.

Anions: HCO_3^- , CO_3^{2-} , S^{2-} , SO_4^{2-} , NO_3^- , Cl^- , Br^- , I^- , NO_2^- , BO_3^{3-} , PO_4^{3-} and SO_4^{2-} .

Cations: Pb^{2+} , Bi^{3+} , Cu^{2+} , Cd^{2+} , Al^{3+} , Fe^{2+} , Fe^{3+} , Mn^{2+} , Zn^{2+} , Co^{2+} , Ni^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , K^+ , Na^+ and NH_4^+

Spot tests should be carried out wherever feasible

The students are required to write any two ionic reactions for both anions and cations given.

PART-B: Preparation of Coordination Complexes

1. Preparation of hexamine nickel(III)chloride.
2. Preparation of potassiumtris(oxalato)ferrate(III) and estimate the iron
3. Preparation of ammonium copper(II)sulphate tetrahydrate.
4. Preparation of potassium tris oxalate aluminate(III) trihydrate.
5. Preparation of mercury tetra thiocyanato cobaltate(II). (Demonstration)

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ELECTIVE PAPER GCH 303

Paper: Chemistry Elective-I

Code: CHSCE-3

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

PAPER: Chemistry Elective-I

[48 Hours]

UNIT-I: Industrial chemistry

[16Hrs]

Fuels: Definition, classification with examples, characteristics, calorific value, determination of calorific value of a solid or liquid fuel (bomb calorimetric method). Applications of gaseous fuels. Comparison between solid, liquid and gaseous fuels. Compressed natural gas, water gas, producer gas and LPG—their production, composition, and applications. **Explosives:** Definition, classification with examples, characteristics of explosives. Preparation and uses of dynamite, cordite and RDX.

Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pour point) and their determination. **[08 Hrs]**

Fertilizers: Economic importance, synthesis of nitrogenous fertilizers- CAN, ammonium sulfate, ammonium nitrate and urea. Phosphate fertilizers-calcium dihydrogen phosphate, super phosphate.

Abrasives: Definition, classification with examples – hardness, manufacture and applications of carborundum, alundum and tungsten carbide. **Refractories:** Definition, properties, classification with examples. Different steps involved in the manufacture of refractories. Applications of refractories.

Ceramics: Introduction, types, manufacturing process, applications. **Glasses :** Introduction, types and compositions with examples and their uses. **[08 Hrs]**

UNIT-II: Organic chemistry

[16Hrs]

Drugs: Definition, chemotherapy and chemo therapeutic agents, types of drugs, antipyretics, analgesics, anaesthetics, antiseptics, antibacterial, antibiotics, antimalarial and sulpha drugs with examples. Synthesis and uses of aspirin, paracetamol, and sulpha guanidine. **Antibiotics:** Structure and mode of action of penicillin-G, chloramphenicol. **Antimalarial:** Structure and mode of action of Chloroquine. **Anticancer/antiviral:** Structure and mode of action of 5-fluorouracil. **[08 Hrs]**

Pesticides -General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Dieldrin);

Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

Dyes: Introduction, colour and constitution, chromophore-auxochrome theory-**chemical methods**, classification of dyes based on applications with examples, synthesis and uses of malachite green, indigo, alizarin and methyl orange. **[08 Hrs]**

UNIT-III: Physical Chemistry

[16Hrs]

Radiation Chemistry: Definition, primary and secondary stages in radiochemical process, G- value, LET of radiation, radiation chemistry comparison with photochemistry. Units of radiation-rad, gray, Roentgen. Chemical dosimeters- Frick-dosimeter, Ceric sulphate dosimeter. Theories of radiolysis – Lind's and EHT theories. Radiolysis of water, cysteine and acetic acid. **[5 Hrs]**

Polymers: Introduction, monomer, repeating units, types (linear, branched and network) with examples, degree of polymerization, Classification: Addition polymerization (free radical, ionic Ziegler-Natta polymerization), Condensation polymerization (polyesters, polyamides, and Urea-formaldehyde resins). Molar masses of polymers – number average and mass average, determination of molar mass by viscosity and osmotic pressure method. Applications of polymers as plastics in electronic, automobile components, medical fields, and aerospace materials. Problems of plastic waste management. **[06 Hrs]**

Elementary Quantum Chemistry: Black body radiation, plank's radiation law, Rayleigh-Jeans law, photo electric effect, and Compton effect (Explanation with mathematical equations). Heisenberg uncertainty principles. Operators – Linear, non-linear, Laplacian, Hermitian and Hamiltonian operators. Postulates of quantum mechanics, Schrodinger wave equation (explanation with mathematical expression) and its importance, wavefunction, physical significance of wavefunction. SWE for particle in one- dimensional box (Numerical problems). **[05 Hrs]**

FOURTH SEMESTER GCH 401

Paper:Chemistry-IV

Code:CHSDSC-IV TH

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

PAPER:Chemistry-IV

[48 Hours]

UNIT-I:InorganicChemistry

[16Hrs]

Nuclear chemistry: Fundamental particles of nucleus, nucleons. Isotopes, isobars and isotones (definition with suitable examples), Nuclear forces (brief explanation), nuclear stability-n/p ratio, mass defect, packing fraction, binding energy, nuclear fission- (definition with suitable examples), calculation of energy release in nuclear fission, modes of release of fission energy (uncontrolled and controlled). Nuclear reactor–Principal components, types of reactors. Nuclear fusion and its advantages over nuclear fission reactions, hydrogen bomb, Q values of nuclear reactions (Numerical problems).

[05Hrs]

Organic reagents in inorganic analysis: Advantages of organic precipitants over inorganic reagents, structures and uses of EDTA in the volumetric estimations of Mg, Ca and Zn. Oxine in the gravimetric estimation of Mg. DMG in the gravimetric estimation of Ni. 1,10-phenanthroline in the colorimetric estimation of Iron.

[03 Hrs]

Gravimetry: Introduction to gravimetric analysis – precipitation methods (various steps involved to be discussed), advantages of gravimetric analysis, purity of the precipitates, co-precipitation and post-precipitation, conditions of precipitation, Nucleation, crystal growth, digestion. Precipitation from homogeneous solution (hydroxides and sulphates), washing and ignition of precipitate (general discussion only).

[04 Hrs]

UNIT-II:OrganicChemistry

[16Hrs]

Carboxylic acids: Definition, classification with examples. Synthesis by Arndt-Eistert reaction, resonance structure of carboxylate ion and its stability. Effect of substituents on acidity of aliphatic and aromatic carboxylic acids.

Hydroxy acids: Synthesis of lactic, citric, and tartaric acids. Effect of heat on α , β , γ -hydroxy acids.

[03 Hrs]

Amines: Definition, classification with example. Separation of amine mixture by Hinsberg's method using toluene sulphonyl chloride. Distinction tests for 1°, 2°, 3° amines (acetylation and Hoffmann's exhaustive methylation. Action of nitric acid on different amines. Both aliphatic and aromatic 1°, 2°, 3° amines, basicity of amines, effect of substituents on basicity of aliphatic and aromatic amines. Hoffmann-Martius rearrangement.

Diazonium Compounds: preparation, mechanism of preparation and synthetic applications of benzene diazonium chloride. Conversion to phenol, halobenzene, phenyl hydrazine and coupling reaction.

[05 Hrs]

Stereochemistry: Introduction, definition, elements of symmetry (plane, centre and alternative axes), asymmetry and dissymmetry, Chirality, designation of configuration (D-L and R-S). Optical activity – explanation – cause of optical activity (non-super impossibility). Enantiomers and diastereomers optical isomerism in tartaric acid and biphenyl compounds, racemisation, resolution, methods of resolution (Chemical and biochemical methods) Walden inversion, asymmetric synthesis (partial and absolute). **Geometrical isomerism:** Definition with example, designation of cis-trans and E-Z notations with examples. Characteristics and identification of geometrical isomers. Geometrical isomerism in aldoximes and ketoximes, Beckmann rearrangement with mechanism.

[08 Hrs]

UNIT-III:PhysicalChemistry**[16Hrs]**

Chemical Kinetics: Molecularity, order, rate and rate constant of reactions (definitions). Zero order reaction (statement and rate equation). Differential and integrated rate equations for second order kinetics, derivation of second order rate equation when $a = b$. and $a \neq b$, unit of 2nd order rate constant, half-life period. Determination of the order of the reaction-differential and time for half changemethod. Effect of temperature on rate of reaction. Temperature coefficient, Arrhenius equation,concept of activation energy-determination using Arrhenius equation and graphical method. Theories of reaction rate: derivation of rate constants from-(i) simple collision theory, (ii) transition state theory (using classical thermodynamics).Problems on half-life period and energy of activation.Experimental methods for the study of chemical kinetics: Conductometric (saponification of esters) and spectro photometric (kinetics of oxidation of Indigo carmine by chloramine-T).

[09Hrs]

Spectrophotometry and Photochemistry: Lambert-Beer's law: Statement and mathematical equation to be derived (problems). Molar extinction coefficient-definition and its determination (graphical method), limitations of Beer's law. Spectrophotometer: Construction and working. Applications of spectrophotometry (mention only).

Photochemistry: Grothus-Draper's law, Stark-Einstein law of photochemical equivalence. Quantum efficiency: definition, reasons for low quantum yield and high quantum yield with examples (photochemical formation of HBr and HCl). Uranyl oxalate actinometer (Problems).

Photophysical processes: photosensitization (taking mercury as an example), photo inhibition, fluorescence and phosphorescence Chemiluminescence and bioluminescence (explanation with examples), mechanism (qualitative).

[07 Hrs]

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PRACTICALS GCH 402

Paper:ChemistryPractical-I

Hours:64

Code:CHSDSCP-IV

Contact Hours/Week	Credits	Scheme of Evaluation:Max.Marks:50		
		Continuous Internal Assessment(CIA)		Semester End Examination(SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

PART-A:PhysicalChemistry(Non-Instrumental) Experiments

1. Determination of the density of liquid using specific gravity bottle and its viscosity using Ostwald’s Viscometer [Carbon tetrachloride, ethyl acetate, water, 1% NaCl solution].
2. Determination of the density of liquid using specific gravity bottle and its surface tension using Stalagmometer [Carbon tetrachloride, ethyl acetate, water, 1% NaCl solution].
3. Determination of molecular mass of a non-volatile solute by Walker-Lumsden method [Urea, NaCl, KCl].
4. Determination of rate constant of the decomposition of hydrogen peroxide catalysed by $FeCl_3$.
5. Determination of transition temperature of the salt hydrates [sodiumthiosulphate, strontium chloride].
6. Determination of rate constant of saponification of ethyl acetate by titrimetry.
7. Determination of percentage composition of sodium chloride by miscibility temperature method [phenol-water system].
8. Determination of first order rate constant of acid hydrolysis of ethyl acetate.
9. Thermometric titration of a strong acid against strong base.
10. Determination of heat of neutralization of strong acid and strong base.

LIST OF EXPERIMENTS

PART-B:Ore/synthetic mixture analysis

1. Determination of iron in the given sample of hematite using potassium dichromate.
2. Estimation of manganese in the given sample of pyrolusite.
3. Estimation of calcium and magnesium in the given sample of dolomite by EDTA method.

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SKILL BASED COURSE (ELECTIVE- COMPULSORY)

Paper: Chemistry Skill Practical Hours:64

Code:CHSSEC-I

Contact Hours/Week	Credits	Scheme of Evaluation:Max.Marks:50		
		Continuous Internal Assessment(CIA)		Semester End Examination(SEE)
		C1	C2	C3
04	02	05 Marks	05 Marks	40 Marks

LIST OF EXPERIMENTS

PART-A:

1. Determination of total acidity of vinegar/waste water by acid-base titration.
2. Spectrophotometric determination of creatinine in urine.
3. Determination of aspirin in the tablet preparations by acid-base titrimetry.
4. Determination of purity of a commercial sample of boric acid.
5. Determination of calcium in pharmaceuticals by EDTA titration.
6. Determination of iron in pharmaceuticals by visual and potentiometric titrations.
7. Food adulteration:Determination of adulteration in food stuffs(Demonstration).
8. Analysis of cement (Demonstration).
9. Determination of nitrite-Nitrogen in fertilizers by spectrophotometry

PART-B

ORGANIC ESTIMATIONS

1. Estimation of aspirin by colorimetric method.
2. Estimation of vitamin-C by iodometric method.
3. Estimation of paracetamol by titrimetric method
4. Estimation of acetone by haloform method
5. Estimation of glucose(sugar)by colorimetric method

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ELECTIVE PAPERS GCH 411

Paper: Chemistry Elective-II

Hours: 48

Code: CHSEC-II

Contact Hours/Week	Credits	Scheme of Evaluation: Max. Marks: 100		
		Continuous Internal Assessment (CIA)		Semester End Examination (SEE)
		C1	C2	C3
03	03	10 Marks	10 Marks	80 Marks

UNIT-I: Inorganic Chemistry

[16Hrs]

Inorganic polymers: Definition – examples, general properties, comparison with organic polymers, glass transition temperature. **Silicones:** Definition, nomenclature, preparation (linear, cross-linked and cyclic). Factors affecting the nature of silicon polymers, properties (chemical and thermal stabilities, chemical properties) uses of silicon polymers, silicon fluids/oils–uses, silicon elastomers – rubbers, silicon resins (preparation and uses). **Phosphazenes:** Definition, types, preparation, structures, properties, nature of bonding and uses. Crystalline polymetaphosphates – Maddrell's and Kuroll's salts, properties and uses and sulfur-nitrogen compounds.

[08 Hrs]

Silicates: Structure, classification-silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional network and applications.

Inorganic fibers: Introduction, properties, classification, asbestos fibers, optical fibers, carbon fibers and applications.

Zeolites: Introduction, types of zeolites, manufacture of synthetic zeolite and applications.

Inorganic pigments: General information and economic importance

White pigments: Titanium dioxide and zinc oxide pigments

Color pigments: Iron oxide, chromium oxide, mixed metal oxide pigments and ceramic colorants, corrosion protection pigments, luster pigments, luminescent pigments and magnetic pigments

[08 Hrs]

UNIT-II: Organic Chemistry

[16Hrs]

Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications. 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.

[08 Hrs]

Concept of Energy in Biosystems: Calorific value of food .Standard caloric content of carbohydrates, proteins and fats.Oxidation of food stuff (organic molecules) as a source of energy for cells. Introduction to Metabolism (catabolism, anabolism). **Nucleic Acids:** Components of nucleic acids: Adenine, guanine, thymine and cytosine (Structure only), other components of nucleic acids, Nucleosides and nucleotides (nomenclature),Structure of polynucleotides;Structure of DNA(Watson-Crick model) and RNA (types of RNA), Genetic Code, Biological roles of DNA and RNA: Replication, Transcription and Translation. [08 Hrs]

UNIT-III:PhysicalChemistry

[16Hrs]

Batteries: Classification, characteristics, primary, secondary batteries. Working of the following batteries- Lead acid and Lithium batteries, Fuel cells. Energetics of cell reactions: Effect of temperature, pressure, and concentration on energetics of cell reactions (calculation of ΔG , ΔH and ΔS).

Corrosion:Introduction,definition,types of corrosion ,electrochemical theory of corrosion.Thermodynamic aspects of corrosion.Corrosion rate,factors affecting corrosion rate-metal and environmental factors-temperature,pH of the medium,humidity,presence of impurities electrical conductivity of the medium, concentration of the medium. Evan diagrams in corrosion cells. **[08 Hrs]** Prevention of corrosion- designing aspects, effect of alloying and surface coating, painting, phosphating, and anodic protection (passivation) cathodic protection. Corrosion inhibitors. Introduction, classification, characteristics and requirements of efficient corrosion inhibitors and their significance, corrosion inhibition mechanism.

Electroplating:Introduction ,electro plating of chromium (hard and decorative

Electro less plating: Introduction, distinction between electroplating and electro-less plating process , Electro-less plating of copper.

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SCHEME OF EXAMINATION

QUESTION PAPER:THEORY EXAMINATION

(Applicable to DSC-3,DSC-4,Elective-I and II)

Time:03Hours

Max.Marks:80

Instructions:Draw an eat labelled diagrams wherever necessary.

PART-A

Answer all of the following

8X1=08

- 1 a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)

PART-B:Inorganic Chemistry

Answer any three of the following

3X8=24 2

- 3
- 4
- 5

PART-C:OrganicChemistry

Answer any three of the following

3X8=24 6

- 7
- 8
- 9

PART-D:PhysicalChemistry

Answer any three of the following

3X8=24

- 10
- 11
- 12
- 13

The sub-questions in Q2-Q13 shall be of (3+3+2) or (5+3) or (4+4) Marks

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CHDSCP-III: CHEMISTRY-III(PRACTICALS) GCH 302**Time:03Hours****Max.Marks:40****Note:**Duly certified practical record shall be submitted for evaluation at the examination.**Distribution of Marks**

Record	5Marks
PartA	25Marks
PartB	10Marks

PART A**Q.No.1: Systematic semi micro qualitative analysis of inorganic salt mixtures**
(two anions and two cations).**25 Marks**

Two anions and two cations should be given from the following constituent ions.

Anions: HCO_3^- , CO_3^{2-} , Cl^- , Br^- , NO_3^- , BO_3^{3-} and SO_4^{2-} .**Cations:** Pb^{2+} , Bi^{3+} , Al^{3+} , Mn^{2+} , Zn^{2+} , Ca^{2+} , Sr^{2+} , Ba^{2+} , Mg^{2+} , K^+ , Na^+ and NH_4^+ .**Note:** 1. Mixtures requiring elimination of phosphate and borate anions should not be given (avoid cations like Mn^{2+} , Ca^{2+} , Sr^{2+} and Ba^{2+} when borate is given).

- Two anions from the same group should not be given.
- Salts that yield SrSO_4 , BaSO_4 , CaSO_4 and PbSO_4 and double decomposition shall be avoided.
- Two cations from the same group should not be given. However, combinations like $\text{Mg}^{2+}/\text{NH}_4^+$, K^+/NH_4^+ and $\text{Na}^+/\text{NH}_4^+$ shall be given.
- NH_4^+ radical may be analyzed and reported in the beginning of detection of cations (ammonium radical shall be considered in the zero group).

DISTRIBUTION OF MARKS

Preliminary Test	Physical state, colour, litmus paper test and Solubility test	03 Marks
Detection of anions	Confirmation of two anions with all test	08 Marks
	Confirmation of one anion with all tests	04 Marks
	Identification of group only	01 Mark
Detection of cations	Group separation table for cations (w.r.t presence of given cations)	02 Marks
	Confirmation of two cations with all tests	08 Marks
	Confirmation of one cation with all tests	04 Marks
Balanced chemical/ionic equation for confirmatory tests	Confirmatory test of any ONE anion given	02 Marks
	Confirmatory test of any ONE cation given	02 Marks

PART B

Q.No.2: Procedure writing for any one of the following.

10 Marks

1. Preparation of mercury tetra thiocyanato cobaltate(II).
2. Preparation of tetraammonium copper(II)sulphate.
3. Preparation of potassium trisoxalato aluminate(III).
4. Preparation of trithio urea copper(I)chloride.

DISTRIBUTION OF MARKS

Reaction equation	03 Marks
Calculation of theoretical Yield	02 Marks
Procedure writing	05 Marks

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CHDSCP-IV:CHEMISTRY-IV(PRACTICALS) GCH402**Time:03Hours****Max.Marks:40****Note:**Duly certified practical record shall be submitted for evaluation at the examination.**Distribution of Marks**

Record	5Marks
Part A	25Marks
Part B	10Marks

PARTA**Q.No.1:Physical Chemistry(Non-Instrumental) Experiments****25 Marks**

Any one of the following experiments shall be given to the candidate.

1. Determination of the density of liquid using specific gravity bottle and its surface tension using Stalagmometer [Carbon tetrachloride, ethyl acetate, water and 1% NaCl].
2. Determination of the density of liquid using specific gravity bottle and its viscosity using Ostwald's viscometer [Carbon tetrachloride, ethyl acetate, water and 1% NaCl].
3. Determination of rate constant of the decomposition of hydrogenperoxide catalyzed by FeCl₃solution.
4. Determination of rate constant of saponification of ethyl acetate.
5. Determination of amount of HCl in the given solution using 1NNaOH solution by thermometric titration method.
6. Determination of percentage composition of the given NaCl solution by miscibility. Temperature method (water phenol system)
7. Determination of first order rate constant of acid hydrolysis of ethyl acetate.

DISTRIBUTION OF MARKS

Experiment	Density of the liquid		Surface tension of the liquid		Viscosity of the liquid	
	Error	Marks	Error	Marks	Error	Marks
Determination of density and surface tension of the liquid.	<u>±2%</u>	08	<u>±4%</u>	12	<u>±4%</u>	12
	<u>±3%</u>	06	<u>±6%</u>	10	<u>±6%</u>	10
	<u>±4%</u>	04	<u>±8%</u>	08	<u>±8%</u>	08
Determination of density and viscosity of the given liquid	Anyother value	02	Anyother value	04	Anyother value	04
	Calculation and unit	01+01	Calculation and unit	02 + 01	Calculation and unit	02 + 01

Experiment	Experiment Skill		Marks	
Determination of percent age composition of the given NaCl solution by miscibility Temperature method (water phenol system)	Unknown1		Unknown2	
	Error	Marks	Error	Marks
	8 %	08	8 %	08
	10 %	06	10 %	06
	12 %	04	12 %	04
	Any other value	02	Any other value	02
	Graph	05		

Experiment	Constant values of K	Marks
Determination of first order rate constant of decomposition of hydrogen peroxide using ferric chloride catalyst OR	05 Values	16
	04 Values	14
	03 Values	12
	02 Values	10
Determination of second order rate constant of saponification of ester. OR	Any other value	06
	Calculation	03
	Unit	01
Determination of first order rate constant of acid hydrolysis of ester.	Graph	04
	K from the Graph	01
Experiment	Error	Marks
Determination of amount of HCl in the given solution using 1N NaOH solution by thermometric titration method	$\pm 0.2 \text{ cm}^3$	18
	$\pm 0.3 \text{ cm}^3$	16
	$\pm 0.4 \text{ cm}^3$	14
	$\pm 0.5 \text{ cm}^3$	12
	Any other value	08
	Graph	04
	Calculation of Normality and Weight/liter	02
	Unit	01

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PART B

Q.No.2: Procedure writing for any one of the following.

10 Marks

Any one of the following experiments shall be given to the candidate.

PART-B: Ore/synthetic mixture analysis

1. Determination of iron in the given sample of hematite using potassium dichromate.
2. Estimation of manganese in the given sample of pyrolusite.
3. Estimation of calcium and magnesium in the given sample of dolomite by EDTA method.

