SEMESTER-V										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credit**	**Duration of exams (Hrs)**
			IA	**SEE**	**Total**	**L**	**T**	**P**		
DSC5	21BSC5C5 CHE5L	Chemistry-5	40	60	100	4	-	-	4	2
	21BSC5C5 CHE5P	Chemistry Lab-5	25	25	50	-	-	4	2	4
DSC6	21BSC5C5 CHE6L	Chemistry-6	40	60	100	4	-	-	4	2
	21BSC5C5 CHE6P	Chemistry Lab-6	25	25	50	-	-	4	2	4

SEMESTER-VI										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/week**			**Credit**	**Duration of exams (Hrs)**
			IA	**SEE**	**Total**	**L**	**T**	**P**		
DSC7	21BSC6C6 CHE7L	Chemistry-7	40	60	100	4	-	-	4	2
	21BSC6C6 CHE7P	Chemistry Lab-7	25	25	50	-	-	4	2	4
DSC8	21BSC6C6 CHE8L	Chemistry-8	40	60	100	4	-	-	4	2
	21BSC6C6 CHE8P	Chemistry Lab-8	25	25	50	-	-	4	2	4
INT1	21BSC6 INT1L	Project work/ Industrial Tour and report	25	25	50	-	-	2	2	2

BSc Chemistry-Semester V

Title of the Course: DSC Chemistry-5: Subject code: 21BSC5C5 CHE5L Paper:1

Course title	**DSC5 Chemistry -5**		
Course Code	**21BSC5C5 CHE5L**	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Objectives:

Students learn about

1. General group trends of d and f block elements
2. Valence Bond Theory (VBT) and Structural and stereoisomerism in coordination complexes
3. Classification and synthesis of Heterocyclic compounds
4. Sources, classification and general characteristics of Alkaloids
5. Principles of green chemistry
6. Selection rules, energy levels and respective transitions in molecular spectroscopy
7. Overview of nanostructures and nanomaterials and polymers

Course outcomes:

After the completion of this course, the student would be able to

1. Predict the Electronic configurations, oxidation states, colour, magnetic properties of d and f block elements
2. Identify the possible types of inner and outer orbital complexes with coordination numbers 4 and 6
3. Write molecular orbital picture and Aromatic character of heterocyclic compounds
4. Write the constitution of Coniine, hygrine and nicotine
5. Appreciate the need for green chemistry and eco-efficiency
6. Identify the selection rules for electronic, vibrational and rotational spectra
7. Elucidate the Properties of Polymers and nanomaterials

V semester
Paper – I

Unit – I **15 hours**

d- and f- block Elements 7 hours

Transition Elements (3d series): General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes.

Lanthanoids and actinoids: Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).

Coordination Chemistry - I 8 hours

Classification of ligands, IUPAC system of nomenclature, Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT.

Unit – II **15 hours**

Heterocyclic compounds 8 hours

Classification, molecular orbital picture and Aromatic character of furan, thiophene, pyrrole and pyridine, synthesis of the following compounds.

i). Furan and pyrrole from 1,4- diketones. ii) Pyridine by Hantzch synthesis. Electrophilic substitution reactions of pyrrole, furan and pyridine (chlorination and nitration), comparison of basicities of pyridine, piperidine and pyrrole.

Alkaloids 4 hours

Definition, source, classification and general characteristics, Hofmann exhaustive methylation with pyridine as an example. Isolation, constitution and confirmation by synthesis – Coniine, hygrine and nicotine

Green Chemistry 3 hours

The need for green chemistry and eco-efficiency, green methods, green products, recycling of wastes, 12 principles of green chemistry

Unit – III **15 hours**

Introduction to Molecular Spectra 2 hours

Electromagnetic radiation, regions of the spectrum, Born-Oppenheimer approximation, degrees of freedom

Electronic Spectroscopy 4 hours

Concept potential energy curves for bonding and antibonding molecular orbitals, qualitative description of selection rules, energy levels and respective transitions, Frank–Condon principle

Rotational Spectroscopy 4 hours

Classification of molecules, rotational spectra of rigid diatomic molecules, criteria for showing the spectra, energy levels of rigid rotator, selection rules (final equations only), calculation of bond length and moment of inertia of HCl molecule

Vibrational Spectroscopy 5 hours

Simple harmonic oscillator, Hooke's law, energy level of simple harmonic oscillator model of diatomic molecule (final equations only), selection rules, zero- point energy determination of force constant and qualitative relation between force constant and bond dissociation energies. Vibrational degrees of freedom of molecules (Linear and nonlinear).

Unit – IV **15 hours**

Properties of Polymers 8 hours

Physical, thermal, Flow & Mechanical Properties, Brief introduction to preparation, structure, properties and application of the following polymers:

polyolefins, polystyrene and styrene copolymers, poly (vinyl chloride) and related polymers, poly (vinyl acetate) and related polymers, acrylic polymers, fluoro polymers, polyamides and related polymers. Phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers, polydienes, Polycarbonates, Conducting Polymers, [polyacetylene, polyaniline, poly (p-phenylene sulphide polypyrrole, polythiophene)]

Inorganic Polymers 3 hours

Inorganic polymers, Types, comparison with organic polymers, silicones, phosphonitrilic halides-formation, structure and applications

Nanomaterials 4 hours

Overview of nanostructures and nanomaterials: classification. Preparation of gold and silver metallic nanoparticles, self-assembled nanostructures-control of nanoarchitecture-one dimensional control. Carbon nanotubes and inorganic nanowires. Bio- inorganic nanomaterials.

BSc Chemistry-Semester V

Title of the Course: DSC-6: Subject code: 21BSC5C5 CHE6L Paper:2

Course title	**DSC6 Chemistry -6**		
Course Code	**21BSC5C5 CHE6L**	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Objectives:

Students learn about

1. Industrial Chemistry of alloys, abrasives, glass, cement and fuels
2. Preparation, mechanism of action and applications of various reagents
3. Classification, colour constitution and synthesis of dyes.
4. Electrochemistry – EMF and Batteries and Fuel Cells
5. Applications of infra-red spectroscopy, UV-Vis spectroscopy and mass spectrometry in organic chemistry

Course outcomes:

After the completion of this course, the student would be able to

1. Write the manufacture and application of alloys, abrasives, glass, cement and fuels
2. Preparation, mechanism of action and applications of various reagents like DCC, DDQ, LTA, NBS, PCC
3. Write the synthesis of various dyes
4. Write the types of electrodes, sign conventions and applications of EMF measurements
5. Understand construction and applications of batteries and fuel cells
6. Identify the molecules using the data from infra-red spectroscopy, UV-Vis spectroscopy and mass spectrometry

V semester
Paper – II

Unit – I **15 hours**

Industrial Chemistry – I 9 hours

Alloys-Significance, types of alloys (ferrous and non-ferrous alloys), preparation (fusion and electro-deposition) and their applications.

Abrasives- Classification, Mohr scale of hardness, Manufacture and application of carborundum, alundum, tungsten carbide.

Glass - physical and chemical properties of glass, raw materials, manufacture using tank furnace, annealing of glass, types, composition and uses of glasses.

Industrial Chemistry – II 6 hours

Cement: Raw materials, composition of Portland cement, manufacture by rotary kiln method, mechanism of setting.

Fuels: characteristic and calorific values of fuels, advantages of gaseous fuels, Manufacture of water gas and biogas.

Unit – II **15 hours**

Reagents and Reactions 9 hours

Preparation, mechanism of action and applications DCC (Amide formation), $LiAlH_4$ (reduction of aldehyde, carboxylic acid and ester), DDQ (Benzylic

oxidation of tetralin, aromatization of tetralin), Lead Tetra Acetate(oxidation of 1,2-diols), NBS(allylic bromination), OsO_4 (hydroxylation of alkenes), PCC(Pyridinium chlorochromate) in the oxidation of primary alcohols.

Dyes 6 hours

Classification, requirement of a dye, colour and constitution. The synthesis of each of the following Class of dyes: Azo dyes-Congo red, Vat dyes–Indigo, Anthraquinone dyes– Alizarin Triphenylemethane dyes–Malachite green, Crystal violet, Phthalein dyes- Fluoroscein, Eosin; Synthesis of each dyes.

Unit – III **15 hours**

Electrochemistry – EMF 10 hours

Electrochemical cells, Reversible and irreversible cells, EMF of a cell and its measurement by potentiometer, standard cell (Weston standard cell), types of electrodes, reference electrode-calomel electrode, sign conventions, Nernst equation, electrochemical series and its applications, salt bridge and its applications. Determination of pH of solution by hydrogen electrode, quinhydrone electrode and glass electrode methods, concentration cell with and without transference, liquid junction potential.

Numerical problems.

Applications of EMF measurements-

i) Determination of solubility and solubility product of sparingly soluble salts.

ii) Potentiometric titrations- acid– base and redox titrations,
iii) Determination of redox potential

Batteries and Fuel Cells 5 hours

Primary and secondary batteries – Construction and Applications of Pb-acid battery, Li-Battery, Lithium-polymer cell, and nickel-cadmium cell. Fuel cells-hydrogen-oxygen and Hydrocarbon–Oxygen fuel cells and their applications.

Unit – IV **15 hours**

Infrared Spectroscopy 5 hours

Introduction to infrared spectroscopy, intensity of absorption band, position of absorptions, C-H, >C=O, O-Hand N-H absorption bands with explanation for variation in stretching frequencies. Identification of H- bonding in alcohols, phenols and carboxylic acids using IR spectroscopy

UV and Visible Spectroscopy 5 hours

Types of electronic transitions, chromophores and auxochromes, bathochromic shift and hypochromic shift, intensity of absorption, Woodward- Fieser rules for calculating λ_{max} of Conjugated dienes such as alicyclic, homoannular and hetero annular dienes. Applications of UV spectroscopy

Mass Spectrometry 5 hours

Principle, determination of m/e ratio, instrumentation, determination of molecular mass and isotopic abundance, molecular ion peak and base peak, McLafferty rearrangement with respect to 2-hexanone, hexenoic acid and methyl hexanoate.

BSc Chemistry-Semester V

Title of the Course: DSC Chemistry Lab-5: Subject code: 21BSC5C5 CHE5P Paper:1

Course title	**DSC5:** Chemistry Lab-5		
Course Code	**21BSC5C5 CHE5P**	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

V Semester Paper I **INORGANIC AND PHYSCIAL CHEMISTRY PRACTICAL**

Part A: Preparation and quantitative analysis of inorganic complexes:

1. Cis- and trans- potassium dioxalatodiaquachromium(III) complex [analysis of oxalate and chromium]
2. Hexamminecobalt(III)chloride [analysis of cobalt]
3. Mercurytetrathiocyanatocobaltate.
4. Preparation of pentamminechlorocobalt (III)chloride.

Part B: PHYSCIAL CHEMISTRY PRACTICAL

Colorimetry

1. Estimation of Fe^{2+} ions concentration in the given solution by titration of FAS versus $KMnO_4$ through colorimetric method.
2. Estimation of Fe^{2+} ions concentration using EDTA through colorimetric method
3. Phase diagram of two component systems and determination of Ec, E_T and the determination of the composition of given unknown.

Potentiometry

1. Determination of single electrode potential of Cu^{2+}/Cu and estimate the given unknown concentration.
2. Determination of single electrode potential of Zn^{2+}/Zn and estimate the given unknown concentration.
3. Titration of $AgNO_3$ versus KCl.
4. Titration of weak acid against a strong base using quinhydrone electrode and calculation of pKa and Ka values of the weak acid.
5. Determination of pH of a buffer by using quinhydrone electrode and comparison of the pH values obtained with glass electrode

Examination

In the practical examination, a batch of maximum 15 (Fifteen) students may be made. Anyone experiment from Part-A or B can be given by selection done by the students based on lots. Viva questions must be asked on any of the experiments prescribed in the practical syllabus only

Part A: Distribution of Marks:

1. Reaction & Mechanism-04 marks,
2. Calculation of theoretical yield – 02 mark,
3. Observed yield -10 marks,
4. M.P- 04 marks,

5. Viva-Voce-5 marks,
Total=25 marks.
Deduction of marks for observed yield: Less than 10% - 10 marks, 11-15% - 8 marks, 16-20% - 6 marks, 21-25 % - 4 marks & above 25% - zero mark.

Part B: Distribution of marks
Accuracy: 12 Marks
Technique and presentation: 03 Marks
Graphs and Calculations: 05 Marks
Viva: 05 Marks
Total 25 Marks
Deduction of marks for accuracy: Error up to 5% - 12 marks, 6 - 10% 09 marks, 11-15% 6 marks, 16 or above 3 marks.

BSc Chemistry-Semester 5

Title of the Course: DSC6 Chemistry Lab-6: Subject code: 21BSC5C5 CHE6P **Paper:2**

Course title	**DSC6:** Chemistry Lab-6		
Course Code	21BSC5C5 CHE6P	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

V Semester Paper II **ORGANIC CHEMISTRY PRACTICAL**

Part A: Preparation (one stage)

1. Cannizarro reaction: Benzaldehyde.
2. Fries rearrangement: Phenyl acetate.
3. Friedel-Crafts reaction: Benzene and Acetyl chloride.
4. Sandmeyer reaction: 4-Chlorotoluene from 4-toluidine.
5. Pechmann reaction: Resorcinol and ethylacetoacetate.
6. Oxidation of Cyclohexanol.
7. Preparation of S- Benzylisothiuronium chloride.
8. Synthesis of p-iodonitrobenzene
9. Synthesis of N-Phenyl-2, 4-dinitroaniline.
10. Synthesis of 2, 4-dichlorophenoxyacetic acid.

Part B: Quantitative analysis

1. Saponification value of oil.
2. Estimation of glucose by Fehling's method.
3. Estimation of keto group.

Examination
In the practical examination, a batch of maximum 15 (Fifteen) students may be made. Anyone experiment from Part-A or B can be given by selection done by the students based on lots. Viva questions must be asked on any of the experiments prescribed in the practical syllabus only.
Part A: Distribution of Marks:
1. Reaction & Mechanism-04 marks,
2. Calculation of theoretical yield – 02 mark,
3. Observed yield -10 marks,

4. M.P- 04 marks,
5. Viva-Voce-5 marks,
Total=25 marks.
Deduction of marks for observed yield: Less than 10% - 10 marks, 11-15% - 8 marks, 16-20% - 6 marks, 21-25 % - 4 marks & above 25% - zero mark.
Part B: Distribution of Marks:
1. Accuracy: 12 (6+6) Marks
2. Technique and presentation: 03Marks
3. Reactions and Calculations: 05 Marks
4. Viva: 05 Marks
Total 25 marks
Deduction of marks for accuracy: ±0.4 CC – 6 marks, ± 0.6 CC- 04 marks, ±0.8 CC- 02 marks, ±1.0 CC - 01 marks. Above ±1.0 CC - 00 marks

BSc Chemistry-Semester VI

Title of the Course: DSC Chemistry-7: Subject code: 21BSC6C6 CHE7L **Paper:1**

Course title	**DSC7 Chemistry-7**		
Course Code	21BSC6C6 CHE7L	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Objectives:

Students learn about

1. Crystal field theory (CFT) with reference to octahedral, distorted octahedral (Jahn- Tellar distortion), tetrahedral and square planar complexes
2. Thermodynamic and kinetic stability of metal complexes
3. Structure, classification and properties of natural products
4. Concept of phases, components and degrees of freedom
5. Laws of photochemistry
6. Liquid-liquid mixtures (miscible, immiscible and partially miscible), Raoult's law and Duhem – Margules equation
7. Basic principles of NMR, Instrumentation and working of a NMR spectrometer
8. Different concepts of Acids and Bases
9. Manufacture and cleaning action of soap and detergent

Course outcomes:

After the completion of this course, the student would be able to

1. Calculate of crystal field stabilization energy of inner and outer orbital complexes with coordination numbers 4 and 6
2. Understand Factors affecting the stability of metal complexes
3. Write the interconversions, synthesis of natural products.
4. Write phase diagram for one and two component systems
5. Explain the reasons for high and low quantum yields with examples
6. Explain the differences between Azeotropes, Immiscible liquids and Partially miscible liquids
7. Interpret of PMR structure of simple organic molecules

VI semester
Paper – I

Unit – I **15 hours**

Coordination Chemistry – II 12 hours

Crystal field theory (CFT) with reference to octahedral, distorted octahedral (Jahn- Tellar distortion), tetrahedral and square planar complexes, calculation of crystal field stabilization energy, factors affecting 10Dq, consequences of crystal field splitting on ionic radii of M^{+2} ions, enthalpy of hydration of M^{+2} ions, explanation of colour and magnetic properties of magnetic complexes, limitations of crystal field theory, calculation of magnetic moment using Gouy's method

Metal-ligand Equilibria 3 hours

Stability of metal complexes (thermodynamic and kinetic), stepwise and overall stability constant and their relationship. Factors affecting the stability of metal complexes

Unit – II **15 hours**

Carbohydrates 5 hours

Haworth and conformational formulae of glucose and fructose, mutarotation
and its mechanism, osazone formation, Killani's synthesis, Ruff's degradation, epimers and epimerisation with respect to monosaccharides, interconversions of glucose and fructose.

Vitamins 4 hours

Vitamins: Classification and importance of vitamin-A, B6, B12, C, D and E. Synthesis of Vitamin-C from D(+)-glucose, synthesis of vitamin-A by van Dorp *et al*

Amino acids, Peptides and Proteins 6 hours

Classification, structure and stereochemistry (D and L) of amino acids, acid-base behaviour, iso-electric point and electrophoresis, peptides- nomenclature and structure of peptides, synthesis of a dipeptide(Bergmann synthesis),Classification of proteins, levels of protein structure(primary, secondary and tertiary structure), protein denaturation and renaturation.

Unit – III **15 hours**

Phase Equilibria 5 hours

Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapor and solid-vapor equilibria, phase diagram for one component systems (H_2O and S) with applications. Phase diagrams for two component systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points

Photochemistry 5 hours

Absorbance, transmittance, Beer-Lambert's law and its limitations, Calculation of molar extinction coefficient. Laws of photochemistry - Grothus-Draper law, Stark – Einstein' s law of photochemical equivalence, Quantum yield - definition, reasons for high and low quantum yields with examples. Photosensitization with examples. Photophysical process - definition, fluorescence, phosphorescence, Chemiluminescence and bioluminescence with examples,

Solutions 5 hours

Introduction - liquid-liquid mixtures (miscible, immiscible and partially miscible), Raoult's law-definition, equation. Duhem – Margules equation (no derivation) and its applications, Azeotropes - definition, minimum and maximum boiling point azeotropes. Immiscible liquids - definition, Partially miscible liquids-definition, conjugate solutions, CST, types I (phenol-water system), II (triethylamine-water system) and III (nicotine-water system).

Unit – IV **15 hours**

^{1}H NMR Spectroscopy 7 hours

Basic principles of NMR. Instrumentation and working of a NMR spectrometer, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constant, areas of signals. Interpretation of PMR structure of simple organic molecules such as ethanol, ethyl bromide, 2-chloroethanol, acetaldehyde, ethyl acetate, propanamide, acetophenone and acetanilide

Acids and Bases 4 hours

Arrhenius, Bronsted-Lowry, Lux-Flood, solvent system and Lewis concepts of acids and bases. Hard and soft acids and bases (HSAB) - classification of acids and bases as hard and soft, Pearson's HSAB concept

Soaps and Detergents 4 hours

Soaps: Introduction, manufacture by modern process, cleaning action of soap. Detergents: anionic, cationic, nonionic, with suitable examples, distinction between soaps and detergents, emulsifiers, stabilisers and builders

BSc Chemistry-Semester VI

Title of the Course: DSC8 Chemistry-8: Subject code: 21BSC6C6 CHE8L **Paper:2**

Course title	**DSC8 Chemistry -8**		
Course Code	21BSC6C6 CHE8L	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Objectives:

Students learn about

1. Nuclear particles, nuclear instability, nuclear fission and fusion, nuclear reactors
2. Essential and trace elements in biological process
3. Solvent properties and typical reactions in liquid ammonia and liquid sulphur dioxide
4. Retrosynthetic analysis, synthons, synthetic equivalents, functional group interconversions
5. Various named rearrangements
6. Sources, classification and general characteristics of terpenes
7. Principles of quantum chemistry
8. Comparison of transition state theory and collision theory
9. Classification, synthesis and requirement of an ideal synthetic drug,
10. Classification of organotransition metal complexes and 18 electron rule

Course outcomes:

After the completion of this course, the student would be able to

1. Explain different types of nuclear reactors, nuclear reactions
2. Explain the biological role of Na, K, Fe and Zn.
3. Write the retrosynthesis of benzocaine and 4-methoxy acetophenone
4. Write the constitution of citral, synthesis of α and β ionones, α-terpeniol
5. Explain Schrödinger' s wave equation, wave function and its significance
6. Explain the chemical kinetics of complex reactions
7. Write the synthesis and uses of antipyrine, novacaine ,chlorpheniramine maleate (CPM) paludrine, tetracyclin. Benedict's reagent and Barfoed reagent.

VI semester
Paper – II

Unit – I **15 hours**

Nuclear Chemistry 8 hours

Nuclear particles (positron, neutrino, mesons, pions, and quarks), nuclear instability, nuclear fission and fusion, nuclear reactors, Different types of nuclear reactors, nuclear reactions (α, n), (n, α), (α, p), (p, α), (p, n) and (n, p). Applications of radioisotopes in tracer technique, neutron activation analysis and carbon dating

Bioinorganic Chemistry 4 hours

Essential and trace elements in biological process, metalloporphyrins with respect to haemoglobin and chlorophyll (structure and function), biological role of Na, K, Fe and Zn.

Non-aqueous solvents 3 hours

Solvent properties and typical reactions studied in liquid ammonia and liquid sulphur dioxide

Unit – II **15 hours**

Retrosynthesis 5 hours

Introduction to retrosynthetic analysis, synthons, synthetic equivalents, functional group interconversions, one and two group C-X disconnection (definitions and examples only). Retrosynthesis of benzocaine and 4-methoxy acetophenone

Rearrangements 6 hours

Wagner-Meerwein, Fries, Wolff, Beckmann, Arndt-Eistert reaction, Wittig and Favorskii rearrangements, Baker-Venkatraman rearrangement. Baeyer-Villiger oxidation. Benzidine rearrangement.

Terpenoids 4 hours

Introduction, classification of terpenes, Ingold's isoprene rule, constitution of citral with synthesis, synthesis of α and β ionones, synthesis of α-terpeniol

Unit – III **15 hours**

Quantum Chemistry 6 hours

Black body radiation, Plank's theory, photoelectric effect, Einstein's photoelectric equation, Compton effect, wave nature of electron, Schrödinger' s wave equation, wave function and its significance, wave particle duality, Eigen function and Eigen values, Equation of motion for a particle, elementary wave motion, particle in one dimension box

Kinetics 6 hours

Derivation of rate constants of unimolecular (Lindemann hypothesis) and bimolecular reaction rates, limitations of collision theory. Transition state theory, Comparison of transition state theory and collision theory, steric factor.

Chemical kinetics of complex reactions-first order reaction, opposing, consecutive and parallel reactions

Micelles (Colloids) 3 hours

Emulsions, micro emulsions or micellar emulsions, and its stability, properties of micro emulsions: electro kinetic effects. Colloidal electrolytes or association colloids, types of colloidal electrolytes. Micelles: surface-active agents or surfactants

Unit – IV **15 hours**

Chemotherapy and Drugs 7 hours

Introduction, requirement of an ideal synthetic drug, classification, synthesis

and uses of the following- Antipyretics–antipyrine, Anaesthetics-novacaine (local) and pentothal sodium(general) Antihistamines–chlorpheniramine maleate (CPM) Antimalarials–paludrine, Antibiotics- tetracyclin. Para pharmaceutical reagents–Benedict's reagent, Barfoed reagent.

Organic reagents in inorganic analysis 3 hours

Sensitivity, selectivity and specificity, advantages of organic reagents over inorganic reagents - Dimethyl glyoxime, 8-hydroxyquinoline(oxime)

Organometallic compounds 5 hours

Introduction, classification of organotransition metal complexes, 18 electron rule with respect to $[Fe(CO)_5]$, $[Ni(CO)_4]$, $[Mn(CO)_5]+$, ferrocene, structure and

bonding in metal olefins (Zeise's Salt)

BSc Chemistry-Semester VI

Title of the Course: DSC7 Chemistry Lab-7: Subject code: 21BSC6C6 CHE7P **Paper:1**

Course title	**DSC7:** Chemistry Lab-7		
Course Code	21BSC6C6 CHE7P	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

VI Semester Paper I **INORGANIC AND PHYSICAL CHEMISTRY PRACTICAL**

INORGANIC CHEMISTRY PRACTICAL

Part A1: Gravimetric analysis

1. Gravimetric determination of Fe in Fe and Cr solution.
2. Gravimetric estimation of Cu in Cu and Fe solution.

Part A2: Volumetric analysis

3. Volumetric estimation of Ca and Mg in Dolomite solution.
4. Volumetric estimation of Cu in Cu and Ni (German Silver).
5. Volumetric estimation of Fe in Cu and Fe solution.
6. Volumetric estimation of Zn in Cu and Zn solution.

Part B:PHYSICAL CHEMISTRY PRACTICAL

1. Study of variation of viscosity of a liquid with temperature, determine the constant A and B.
2. Determination of pH of acetic acid with sodium acetate buffer by pH metry method.
3. Determination of pKa value of phosphoric acid by pH meter.
4. Evaluation of Arrehenius parameter for the reaction between $K_2S_2O_8$ versus KI (first order)

Conductometry

5. Acid mixture versus NaOH
6. Weak acid with salt versus NaOH
7. Strong acid with salt versus NaOH

Potentiometry

8. Acid mixture versus NaOH
9. $KMnO_4$ versus FAS

Examination

In the practical examination, a batch of maximum 15 (Fifteen) students may be made. Anyone experiment from Part-A or B can be given by selection done by the students based on lots. Viva questions must be asked on any of the experiments prescribed in the practical syllabus only

Part A1: Distribution of marks

1. Accuracy: 12 (6+6) Marks
2. Technique and presentation: 03Marks
3. Reactions and Calculations: 05 Marks
4. Viva: 05 Marks

Total 25 marks

Deduction of marks for accuracy: ±0.4 CC – 6 marks, ± 0.6 CC- 04 marks,
±0.8 CC- 02 marks, ±1.0 CC - 01 marks. Above ±1.0 CC - 00 marks

Part A2: Distribution of marks
1. Accuracy: 12 Marks
2. Technique and presentation: 03Marks
3. Reactions and Calculations: 05 Marks
4. Viva: 05 Marks
Total 25 marks
Deduction of marks for accuracy: ±6mg – 12 marks, ± 7 mg- 10 marks, ±8mg - 08 marks, ±10 mg - 06 marks. Above 10mg - 00 marks

Part B: Distribution of marks
1. Accuracy: 12 Marks
2. Technique and presentation: 03marks
3. Graphs and Calculations: 05 Marks
4. Viva: 05 Marks
Total 25 marks

Deduction of marks for accuracy: Error up to 5% - 12 marks, 6 - 10% 09 marks, 11-15% 6 marks, 16 % or above 3 marks.

BSc Chemistry-Semester VI

Title of the Course: DSC8 Chemistry Lab-8: Subject code: 21BSC6C6 CHE8P **Paper:2**

Course title	**DSC8:** Chemistry Lab-8		
Course Code	21BSC6C6 CHE8P	No. of Credits	**04**
Contact hours	**60 Hours (4 Hours/ week)**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

VI Semester Paper II

ORGANIC CHEMISTRY AND SPECTROSCOPY PRACTICAL

Part A: Preparation (Two and three stages)

1. 2,4-Dinitrophenylhydrazine from chloronitrobenzene.
2. Anthranilic acid from phthalic acid.
3. Benzanilide from benzophenone.
4. Benzilic acid from benzoin.
5. Synthesis of Acridone.
6. Synthesis of Hydantoin.
7. Recording/predicting/downloading from websites the UV, IR,NMR spectra of the compounds prepared in organic chemistry practical

Part B: Quantitative analysis

8. Titrimetric estimation of amino acids.
9. Estimation of phenols.
10. Iodine value of oil (chloramine-T method).

Examination

In the practical examination, a batch of maximum 15 (Fifteen) students may be made. Anyone experiment from Part-A or B can be given by selection done by the students based on lots. Viva questions must be asked on any of the experiments prescribed in the practical syllabus only

Part A: Distribution of Marks:

1. Reaction & Mechanism-04 marks,
2. Calculation of theoretical yield – 02 mark,
3. Observed yield -10 marks,
4. M.P- 04 marks,
5. Viva-Voce-5 marks,

Total=25 marks.

Deduction of marks for observed yield: Less than 10% - 10 marks, 11-15% - 8 marks, 16-20% - 6 marks, 21-25 % - 4 marks & above 25% - zero mark.

1. Accuracy: 12 (6+6) Marks
2. Technique and presentation: 03Marks
3. Reactions and Calculations: 05 Marks
4. Viva: 05 Marks

Total 25 marks
Deduction of marks for accuracy: ±0.4 CC – 6 marks, ± 0.6 CC- 04 marks,
±0.8 CC- 02 marks, ±1.0 CC - 01 marks. Above ±1.0 CC - 00 marks

BSc Chemistry-Semester VI
Title of the Course: INT1 (Project work/Industrial visit and report)
Subject code: 21BSC6 INT1L

Course title	**INT1(Project work/Industrial visit and report)**		
Course Code	21BSC6 INT1L	No. of Credits	**02**
Contact hours	**32 Hours or 2 Hours/ week**	Duration of SEA/Exam	**2 hours**
Formative Assessment Marks	**25**	Summative Assessment Marks	**25**

Project work on various topics pertaining the entire B.Sc Chemistry syllabus can be given. A batch of maximum 5 students can be given a single topic for project.

Alternatively the students can be taken to visit different industries/ research institutes and detailed report incorporating the salient features of the visit to be submitted by students. Ideally the visit can be undertaken in between 6^{th} to 8^{th} week of the semester to enable the students to prepare the report before the semester end exam.