ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A+ 'Grade by NAAC(CGPA:3.68/4.00)
College with Potential for Excellence by UGC
DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Science (B.Sc.)

SUBJECT: B.Sc.

B.Sc. V Semester

Paper-DSE-I

Reactions, Reagents and Mechanisms in Organic chemistry

SUBJECT	EXAMINATION	MAX. MARKS	MIN.MARKS
CHEMISTRY	CCE EXAM	40	35
	FINAL EXAM	60	

ASSISMENTAND EVALUATION

Assessment and presentation	09
Classtest-I (Objective Question)	08
Classtest-II (Descriptive Question)	08
Overall performance through out the year(attendance and behavior)	15
Total	**40**

Theory Paper:

SECTION WISE MARKS DISTRIBUTION

S. No.	SECTION	TOTALNO. OFQUESTION	MARKS
1	A	Objective Question	5 X1=5
2	B	Short Answer Question	5 X4 =20
3	C	Long Answer Question	5 X7 =35
		Total	**60**
	Internal and External Marks	**Grand Total**	**40+60 =100**

Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc. V Sem	DSE-I	S3CHEN3D	Instrumental Techniques in Chemistry	Max: 100	Min: 35

Course Objectives:

- To enable the students in standard samples for analysis
- To enable the Instrumentation for Analytical methods of Chemistry
- To enable the students in understanding Instrumentation for various spectroscopic techniques
- To enable the Principles and instrumentation of various selection analytical techniques
- To enable the Instrumentation use optical methods of analysis
- To enable the Advance Chromatography Techniques

UNIT– I

Practical Aspects of Chemical Analysis

(a) Analysis of real samples: Choice of analytical method, Analysis of standard samples, preparing standard samples for analysis moisture in sample, drying the analytical sample, decomposition and dissolution of sample, source of errors in decomposition and dissolution.

(b) Automation in Laboratory: Introduction, classification of analytical methods. Types of instrumental methods. Importance of instruments for analysis. Analog & Digital signals, for planning for laboratory automation. An overview of automatic instruments & instrumentation. Good laboratory practices. Instrumental standardization, optimization of procedures.

Unit- II

Electronic and Vibrational-Rotational Spectroscopy

(a) Electronic or Ultra-Violet Visible (UV-Vis) Spectroscopy: Basic principles, Instrumentation and Techniques.

(b) Fourier-transform infrared (FTIR) Spectroscopy: Introduction and basic principle of IR spectroscopy, Instrumentation. Working of FTIR Spectrophotometer, Advantages of FTIR Spectroscopy.

(c) Raman Spectroscopy: Mechanism of Raman Effect- Quantum theory and classical theory. Instrumentation and techniques. Qualitative treatment and techniques. Qualitative treatment of Rotational Raman effect, Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-Stokes lines, their intensity difference, rule of mutual exclusion.

Unit- III

Molecular Characterization techniques

(a) Nuclear Magnetic Response Spectroscopy: Basic principles of NMR, Instrumentation- Magnet, sweep generator, RF generator, RF receiver, signal recorder, calculation of NMR signals.

(b) Electron Spin Resonance (ESR) spectroscopy: Introduction, principle, instrumentation,

selection rules, interpretation of Lande‟s factor g. Hyperfine and super hyperfine coupling.

(c) Mass Spectrometry: Theory of mass spectrometry. Principle and operation of mass spectrometer. Ionization techniques- electron impact, chemical ionization, electro spray, electrical discharge, lase desorption, fast atom bombardment.

Separation of ions on the basis of mass-charge ratio. Analyzers-Magnetic-sector, Electric quadrupole and high-resolution multiple-reflection time of flight (MR-TOF)

Unit- IV

Atom Characterization Techniques

(a) Flame photometry: Flame emission spectroscopy, characteristics of flame, instrumentation & working of flame photometer.

(b) Atomic Absorption Spectroscopy (AAS): Basic principles, Instrumentation, atomizer, monochromator, detector, sensitivity and detection limits. Interferences in AAS and their elimination.

(c) Atomic mission Spectroscopy (AES): Principles, Sources for excitation, Instrumentation, Qualitative and quantitive Analysis.

Unit-V

Electro analytical techniques

(a) Polarography: General principles and instrumentation of polarography half-wave potential, equations for reversible cathodic, anodic and cathodic-anodic waves ,analysis of reversible polarographic wave.

(b) Voltametry: General principles and instrumentation of polarography, half-wave potential, equations for reversible polarographic wave.

(c) Amperometry: Principles and amperometric titration techniques- Dropping mercury electrodes. Instrumentation and measurement of electro motive force of cell (EMF). Potentiometric titrations.

(d) Conductometry: Principle, measurement of conductance, conducto metric titrations.

Unit- VI

Optical and Advanced Chromatographic Techniques

(a) Polarimetry: Polarimeter, optical rotations, measurements of optical rotation.

(b) Refractometry: Principle of refraction, Snell „slaw, Construction & working of refractometer.

(c) Gas Chromatography (GC): Theory, Instrumentation-description of equipment and different parts, columns (packed and capillary columns).Detector specifications, Thermal conductivity detector, Flame ionization detector, electron capture detector, nitrogen-phosphorous detector or thermionic specific detector (TSD), photo ionization detector. Programmed temperature gas chromatography.

(d) High Performance Liquid Chromatography (HPLC): Theory, Instrumentation, description of the different parts of the equipment, stationary phases (columns), mobile phases, detectors, UV detector, refractive index (RI) detector, Fluorescence detector, Photo Diode Array detector, Evaporative Light Scattering Detector (ELSD), conducto metric detector and electrometric detector.

Course Outcomes: By the end of this course student will learn the following aspects of instrumental technique in chemistry:

- Preparation of standard samples for analysis
- Instrumentation for Analytical methods of Chemistry
- Instrumentation for various spectroscopic techniques
- Principles and instrumentation of various electro analytical techniques
- Instrument at ion used in optical methods of analysis
- Advance Chromatography Techniques

Reference Books:

1. Galen,e.,"Instrumentalmethods&chemicalanalysis",McGraw-Hillpublishing company ltd., 1985.
2. Christian,G.D.,"AnalyticalChemistry",JohnWileyandSons.Inc,1944.
3. Harris,D.C.,"QualitativeChemicalAnalysis",W.H.Freeman&Co.NewYork,2003, 7th Edition.
4. Drago,R.S.,"PhysicalMethodsinChemistry",W.B.SaundersCo, 1977.
5. AtkinsP.W.,"Physical Chemistry",OxfordUniversityPress, 2017.

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Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc. V Sem	Core	S3CHEM1D	Green and Agriculture Chemistry	Max: 100	Min: 35

Course Objectives:

- To enable the students to understand and the concept and principles of green chemistry
- To promote learning of green catalysis and processes in Chemistry
- To under stand Soil fertility evaluation and soil testing
- To build concepts in Principles of organic manuring
- To enable the understanding of Fertilizers, types and applications

Unit 1 Concepts and Principles of Green Chemistry:

History and evolution of twelve principles of green chemistry and their explanations with examples. Tools of green chemistry green solvents, green catalysts, energy efficient processes environmentally benign products, dry media synthesis. (Use of sun light, UV, microwave and ultrasonic energy).

Metrics of green chemistry different metrics relating to the principles of green chemistry, atom economy percentage yield reaction mas efficiency, effective mass efficiency, environmental factor, eco scale and biologic tool plots, difference between mass based and impact based metrics life cycle assessment (ICA) and environment food print challenges and scope of Green chemistry in India keywords Green chemistry, green solvents, green catalysis, atom economy, environmental factor.

Unit 2 green catalysis and processes:

Heterogeneous catalysis use of zeolites, silica and alumina supported catalysis, bio catalysis, Enzymes, microbes phase transfer catalysis (micellar/ surfactant) prevention of chemical accidents designing greener processes, strengthening / development of analytical technique to prevent and minimize the generation of hazardous substances in chemical process.

Cutting edge research in pharma, paint, detergent and other synthetic industries. Green synthesis of the following compounds adipic acid and catechol microwave assisted reaction in water - Hoffmann elimination oxidation of toluene and alcohols

Keywords- Heterogeneous catalysis, zeolites, silica, phase transfer, greener processes, green synthesis

Unit 3 Soil Fertility:

Soil fertility evaluation and soil testing. Critical levels of different nutrients in soil.

Forms of nutrients in soil, plant analysis, rapid plant, tissue tests, indicator plants.Methods of fertilizer recommendation to crops. Factors influencing nutrient use efficiency (NUE) methods of application under rain fed and irrigated conditions

Keywords- Soil fertility, plant analysis, indicator plants, crop, rain fed.

Unit -4 Organic Manuring:

Classification and importance of organic manures, properties and methods of preparation of bulky manures green/ leaf manuring transformation reactions of organic manures in soil and importance of C:N ratio in rate of decomposition.
Keywords- Organic manure, bulky manures, leaf manuring, CN ratio, decomposition

Unit- 5 Fertilizers:

Chemical fertilizers, classification, composition and properties of major nitrogenous, phosphate, potassic fertilizers, secondary and micronutrient fertilizers complex fertilizers, Nano fertilizers.

Soil amendments fertilizer storage and fertilizer control order. History of soil fertility and plant nutrition, criteria of essentiality.Role deficiency and toxicity symptoms of essential plant nutrients. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Course outcomes:

By the end of these course student will acquire the knowledge of the following aspects of green chemistry and agriculture chemistry

- Basic principles of green and sustainable Chemistry
- Understand stoichiometric calculation and relate them to green process metrics.
- Learn alternative solvent media, green catalysis and energy sources for chemical processes
- Understand the requirement of manure and fertilizers for various crops and their proper time of application
- Understand to maintain sol fertility for better crop production

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Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc. V Sem	DSE Practical	S3CHEN3D	Instrumental Techniques in Chemistry	Max: 100	Min: 35

General Objective:

- To enable the students to createn understanding about the laboratory practices, various laboratory techniques and analysis.
- To recognize safe laboratory practices, handling laboratory glassware, equipment, and chemical reagents.
- To enable the students too perate spectrophotometer, conductometer, polarimeter and pHmeter

EXTERNAL ASSESSMENT: 60marks

Course Content:

1. Determination of concentration of Ferric ions in Ferric salicylate complex spectrophotometrically.
2. Spectrophotometric determination of pKValue of an indicator.
3. Determination of Sodium and Potassium infruit sample by flame photometer
4. Spetrophotometric determination of stoichiometric and stability of complex
5. Determination of Sulphate and phosphate by spectrophotometry
6. Determination of specific rotation of a given optically active compound by Polarimetry determination of the enzyme catalyzed inversion of sucrose by polarimetry
7. Potentiometric titration of a given Strong acids titration with an NaOH solution
8. Conductometric titration of Strong acid solution with an NaOH solution
9. Conductometric titration of a givenWeak acid solution with an NaOH solution
10. pH metric-Strong acid solution with an NaOH solution
11. pH metric-Weak acid solution with an NaOH solution.

INTERNALASSESSMENT:40 marks

Internalassessment	Marks	Externalassessment	Marks
ChemicalandLabsafety Class Interaction / Quiz	10	Viva-VoceonPractical	10
Attendance	10	PracticalRecordFile	10
Assignment (Charts/ model seminar/Rural services/ Technology dissemination/ Report of Excursion/ Lab visits/ Survey/ Industrial visit)	20	Table work/ Experiments	50
TOTAL	40		60

Course Outcomes:Bytheendofthis coursestudentwill be able to understand

- Preparationofstandardsamplefor analysis
- Determinationofconcentrationofthesolutionbyspectroscopic method
- Determinationofstabilityconstant
- Determinationofpotentiometricandconductometrictitration
- Advanced Chromatographictechnique

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Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.V Sem	CORE Pract	S3CHEM IQ	Green and Agriculture Chemistry	Max: 100	Min: 35

General Objective:

To apply the concept of green and soil chemistry in experimental chemistry.

To understand soil sampling and profiling through experimentation.

EXTERNAL ASSESSMENT:60 marks

Course Content:

1. Manganese (III) acetylacetonate complex by using potassium permanganate and acetyl acetone in water

2. Green prepration of Iron (III) acetylacetonate complex by using ferric trichloride and potassium hydroxide in water

3. Diels Alder reaction

4. Benzoin Condensation

5. Study of soil profile in the fields

6. Study of soil sampling tools, Collection of representative soil sample its processing and storage

7. Study of soil forming rocks and mineral

8. Estimation of organic matter contain of soil

9. Determination of soil pH and electrical conductivity

10. Determination of cation exchange capacity of soil

11. Determination of soil density moisture content and porosity

12. Determination of soil texture

Out comes:

- To learn green synthesis of organic and inorganic compounds
- To learn to prepare green ionic liquids

- To understand soil profile, sampling and study mineral present in Soil
- To learn to estimate organic matter content of soil

INTERNALASSESSMENT:40marks

Internal assessment	Marks	Externalassessment	Marks
Chemical and Labsafety **Class Interaction / Quiz**	**10**	**Viva- Voce on Practical**	**10**
Attendance	**10**	**PracticalRecordFile**	**10**
Assignment (Charts/ model seminar/ Rural services/ Technology dissemination/ Report of Excursion/ Lab visits/ Survey/ Industrial visit)	**20**	**Table work/ Experiments**	**50**
TOTAL	**40**		**60**

Class	*Course Type*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.VI Year	Core	S3CHE 4D	Bio-Physical, Bioinorganic and Organometallic compound	Max: 100	Min: 35

Course Objectives:

- To develop Biophysical concepts like pH, Biological oxidation, bioenergetics.
- To enable understanding of Magnetic properties and electronic spectra of transition metal complexes
- To learn about Bioinorganic and Organo metallic compounds, their structure and bonding, types and applications.

Unit- I

(a) Water, pH and buffer:
Water, pH and buffer water as a medium for biological reaction, concept of p in terms of biological system, effect of pH on a biomolecule, biological buffer system
Bonding in biomolecule hydrogen bond, vanderwal interaction, ionic bond hydrophobic attraction, glycoside linkages peptide bond, phosphodiester linkage role of different biological buffer system like phosphate buffer, biocarbonate buffer protein aminoacid buffer, hemoglobin buffer system

(b) Biologycal Oxidation: Definition, types of biological oxidation, reduction oxidation by direct action of oxygen, oxidation by loss of hydrogen electron transport chain, inhibitors of ETC
(c) Oxidative phosphorylation – definition, theories inhibitors of oxidative phosphorylation, un-couplers
(d) Bioenergetics – couple reaction, law of thermodynamics, free energy, relationship between standard free energy change and equilibrium constant general introduction of high energy compounds structure of ATP as universal currency of free energy in biological system with example in muscle contraction, free energy of ATP hydrolysis

Unit- II

Magnetic properties of transition metal complexes
Magnetic properties of transition metal complexes introduction, types of magnetic behaviors, diamagnetism paramagnetic, and ferromagnetism, anti-ferromagnetism, ferrimagnetism, origin and calculation of magnetism. Methods of determining magnetic susceptibility Gouy‟s, BhatnagarMathur, Quincke‟scurie and nuclear magnetic resonance method magnetic moment, L-Scoupling determination of ground state terms symbol, orbital contribution to magnetic moment and application of magnetic moment data for 3D metal complexes

Unit- III

(a) Organo metallic compounds

An introduction to organometallic compounds- Definition and classification with appropriate example based on nature of metal carbon bond (ionic, s, p ,and multicenter bonds)
Metal alkyls important structural features of methyl lithium (tetramer) and trialkyl aluminum (dimer), concept of multicenter bonding in these compounds. Role of triethyl aluminum in polymerization of ethene Ziegler Natta catalyst

(b) Organo magnesium compound–Grignard"sreagents preparation structure and chemical reaction

(c) Organo zinccompound-preparation and chemical reaction

(d) Organolithium compounds- preparation and chemical reaction organosulpur compounds-nomenclature structure characteristics thio ether, sulphonics acid, sulphonamide and sulphaguanidine methods of preparation and chemical reactions

Unit- IV

Metal carbonyls
Metal carbonyls 18 electron rule, electron count of mono nuclear, polynuclear and substitute metal carbonyls of 3D series general methods of preparation (direct combination reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3D series.Structure of mono nuclear and bi nuclear carbonyl of Cr, Fe, Co and Ni using VBT.π-acceptorbehaviour of CO (MO diagram of CO to be discussed) synergic effects and use of IR data to explain extent of back bonding. Zeise"s salt preparation and structure, evidences of synergic effects and comparison of synergic effect with that in carbonyls.

Unit- V

Bioinorganic chemistry-
Bioinorganic chemistry metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on thedistribution of metals.Na/ K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, USE of chelating agents in medicine. Iron and its application in bio-systems, Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting. Hemoglobin: storage and transfer of iron

Course outcome: By the end of this course student will be able to understand

- Biophysical concept like pH, Biological oxidation, bioenergetics.
- Magnetic properties and electronic spectra of transition metal complexes
- Bioinorganic and Organometallic compounds, their structure and bonding, types and applications.

ReferenceBooks:

1. Vogel,A. I.QualitativeInorganicAnalysis, Longman,197236.
2. Svehla,G.Vogel"sQualitativeInorganicanalysis,7th edition,PrenticeHall,1996-03-07.
3. Huheey,J.E.,Keiter,E.A.&Keiter,R.L.InorganicChemistry,PrinciplesofStructure and Reactivity 4th Ed., Harper Collins 1993, Pearson, 2006.
4. Lee,J.D. ConciseInorganic Chemistry5thEd., John Wileyand sons 2008.
5. Sharpe,A.G. InorganicChemistry,4thIndianReprint(PearsonEducation) 2005.

Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.VI Year	DSE-I	S3CHEM 3D	Laboratory Skills, technique and management	Max: 100	Min: 35

Course Objectives:

- To enable the understanding of Laboratory organization and management-
- To understand the Hazards in Laboratory maintenance and Safety
- To develop an understanding of Basic Laboratory Apparatus, Equipment and Basic Laboratory Techniques in Chemistry

Unit-1 Laboratory organization and management-

- **Science laboratory**: scientific temper, scientific reporting, significance values/ accuracy/ attitude, interaction with pupil present in the lab, dignity of work of lab staff
- **Important components of a science laboratory**: features of a science laboratory, services in a science laboratory
- **Organization of science labs**: preparation room, arrangement of stores, safety provisions, Labels- a cautionary note
- **Day-to-day management of laboratories**: day to day cleaning up, routine inspection and maintenance of laboratory, cleaning of laboratory and preparation rooms, colour coding of services, emergency switch services, security and vandalism.
- **Stock control and purchase**: arranging stock, naming and maintenance of stock register, receiving of goods, processing of bills, accounting, controlling budget, information about equipment & miscellaneous records, purchase rules.
- **File and records**: sources of information in the lab, filing system for chemicals, requests for equipment & special files
- **Use of computer in science laboratory**: component of a computer, overall function & application software

Key words- Color coding, Vandalism, Budget, overall function, safety provisions, stock register, purchase rules.

Unit-2 Hazards in Laboratory & Laboratory Safety-

- **Electricity and gas hazards**: electricity hazards in the laboratory (selection of proper fuse, selection of proper flex, safe conduct, earthling& other dangers associated with electrical equipment's), Gas hazards in the laboratory (LPG, high pressure gas hazards, detection and handling of gas leakage & low pressure gas hazards).
- **Fire hazards**: fire hazards in the laboratory, classification of fire, precaution of fire prevention & extinguishing a fire and types of fire extinguishers.
- **Chemical hazards**: classification of hazardous chemicals, handling of chemicals, storage of chemicals, transport of bulk chemicals & transfer from. large containers.
- **Personal safety**: Code of behavior for the laboratory staff, personal protective devices, disposal of waste materials, check-in & shut down sequences & shifting load

- **Accidents and first aids**: accident reporting, procedure, first aid box, general features of first aid procedure, first aid procedures for chemical accidents, first aid treatment for shock & first aid treatment of localized injuries.

Keywords- Gas hazards, proper flex, LPG, Fire Extinguisher, code of behavior, First aids.

3. Basic Laboratory Apparatus and Equipment in Chemistry

- **Basic Apparatus**: Identification of apparatus, apparatus for heating (Bunsen burner, water bath, Oil bath, hot plate & heating mantle), laboratory glassware, laboratory centrifuge, use and description
- **Measuring Apparatus**: Measurement in chemistry lab, errors, precision and accuracy of measurement, volume, types of volume, measuring devices, burettes & pipettes, accuracy of burettes & pipettes, volumetric flask, mass and weight, balances analytical and electronic, pH meter and conductometer
- **Common laboratory glassware**: laboratory glass ware and its types, cleaning methods, storage and handling of glass apparatus, assembly of glass apparatus, gas pressure in glass, safety measures for storage, caring & handling of glassware

Keywords- Water bath, heating mantle, centrifuge, precision, gas pressure.

4. Basic Laboratory Techniques in Chemistry

Solutions and their preparation: Water and its types, types of solution, solubility, concentration of solutions- percentage, molarity, molality, normality & ppm, calculation of mass and volumes to prepare solutions, general guidelines for preparation of solution, general methods of preparation, labeling, exceptions to the general method, notes on other solution reagents for chemistry, bench reagents, standard solutions.

- **Common laboratory techniques**: Heating, refluxing, filtration, small scale methods, recrystallization and determination of melting point, distillation and determination of boiling point

Keywords- Concentration units, labeling, bench reagents, refluxing, recrystallization, melting point, boiling point.

Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.VI Year	DSE	S3CHEM 3D	Laboratory Skills, technique and management	Max: 100	Min: 35

ASSISMENTAND EVALUATION

Assessment and presentation	20
Class test(Descriptive Question)	10
Assignment	10
Total	**40**

Theory Paper:

SECTION WISEMARKS DISTRIBUTION

S. No.	**SECTION**	**TOTALNO. OFQUESTION**	**MARKS**
1	A	Very Short Question	6 X1=6
2	B	Short Answer Question	6 X3 =18
3	C	Long Answer Question	6 X6=36
		Total	60
	Internal and External Marks	**Grand Total**	**40+60 =100**

Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B. VI SEM	DSE - II	**S3CHEM2T**	Pharmaceutical and Medicinal Chemistry	Max: 100	Min: 35

Course Objectives:

- To enable the students to understand the importance of pharmaceutical chemistry and pharmacopeia.
- To learn concept of intellectual property rights, patents, trademark and copyright.
- To Understand drugs, types, classification and mechanism of action.
- To enable the students Describe the structure activity relation of some important class of drugs.
- To understand the overall process of drug discovery and the roleplayed by medicinal chemistry.
- To relate the structure and physical properties of drug to their pharmacological activity.

Unit-I

Pharmaceutical Chemistry:
Introduction to Pharmacy, career in pharmacy, codes of pharmaceutical ethics, importance of pharmaceutical chemistry, pharmacopeia and its history (IP, BP, USP, NF).
Drug and cosmetic act with special reference to schedule M, GMP, GLP, GCP, USFDA, NDA, clinical trial.

Concept of quality and total quantity management, quality assurance and quality control, IPQA, IPQC. Documentation and maintenance of record, intellectual property rights, patents, trademarks, copyright, patent act.

Unit- II

Pharmacognosy:
Definition, history, scope and development of Pharmacognosy.
Classification and sources of drugs: classification of drugs, sources and use of natural drug product, biological (plants, animals and microbes), geographical, marine and mineral resources.
Drug Receptors: Introduction to drug receptors, nature of drug receptors, different bonding involved in drug receptor interaction, drug receptor theories.
Drug absorption : routes of drug administration, absorption of drug and factors affecting absorption.

Unit- III

Molecular Modeling and Drug Design:
Drug design and development an overview, analogues and prodrugs structure and activity relationship

between chemical (SAR), factors governing drug design, approaches to drug design, receptor site theory, introduction to combinatorial synthesis in drug discovery, factors affecting bioactivity. QSAR-Free-Wilson analysis, structure a biological activity, Hansch Analysis, relationship between Free-Wilson analysis and Hansch analysis.

Unit- IV

Antibiotics and Anti-bacterials:
Introduction, Antibiotic β-Lactum Type- penicillin, cephalosporins, antitubercular- streptomycin, Broad Spectrum Antibiotics- Tetracyclines, Anticancer- Dactinomycin (Actinomysin D)

Unit- V

Antifungal and Non-Steroidal Anti-inflammatory Drugs:
Antifungal: Polysenes, Antibacteria-Ciprofloxacin, Norfloxacin, Antiviral-Acyclovir. Antimalarials :Chemotherapy of Malaria SAR,Chloroquine, Chloro guanide and Mefloquine. Non-steroidal Anti-inflammatory Drugs: Diclofenac Sodium, Ibuprofen and Netopam.

Course out come: By the end of this course student will be able to understand

- Importance of pharmaceutical chemistry and pharmacopeia.
- Intellectual property rights, patents trademark and copyright.
- Drugs, types, classification and mechanism of action.
- Structure activity relation of some important class of drugs.
- Overall process of drug discovery and the role played by medicinal chemistry.
- Structure and physical propertie 4 sofdrug to the irpharmacological activity.
- Physio-chemical properties relatedto QSAR.

ReferenceBooks:

1. "PharmaceuticalChemistryInorganicVol.1",ChatwalG.R.,HimalayaPublishing House, Mumbai, 2010.
2. "TextbookofPharmacognosy",WallisT.E.,CBSPublishersandDistributers,New Delhi, 2005, Fifth Edition.
3. "PharmaceuticalChemistry",ChoudharyN.C.andGurbaniN.K.,VallabhPrakashan, New Delhi, 2009, Fifth Edition.
4. "PharmaceuticalChemistry",WatsonD.G.,ChurchillLivingstoneElsevier,UK, 2011.
5. "TextBookOfProfessionalPharmacy".JainN.K.andSharmaS.N.,Vallabh Prakashan,NewDelhi, 2009,Fifth Edition.

Class	*CourseType*	*Course Code*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.VI SEM Year	Core (Practical)	S3CHEN4D	Bio-Physical, Bio inorganic and Organometallic compound	Max: 100	Min: 35

General Objective:

- To understand concepts in Bio-Physical, Bioinorganic and Organometallic compound through synthesis and estimation of various compounds and analysis of their properties

EXTERNALASSESSMENT:60marks

Course Content:

2. Synthesis of Ferrocene from $FeCl_3$
3. Synthesis of $K_2[Fe(C_2O_4)_3]$Complex
4. Synthesis of Sodium tri oxalate ferrate
5. Synthesis of Nitrobenzene
6. Synthesis of Cr $(C_5H_5)_2$complex
7. Synthesis of Aceto-Fe complex
8. Synthesis of triphenyl methanolfrom benzoic acid using Grignard reagents
9. Determination of pH of the BioSample
10. To determine the sugar in cough syrup by spectrophotometer
11. Estimation of Copper by Copper Sulphate
12. Determination of Rf Value in given inorganic mixture

Course Outcomes:By the end of this course student will be able to understand

- Synthesis and /estimation of compounds

Class	*Course Type*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.VI Year	Major	Laboratory Skills, technique and management	Max: 100	Min: 35

To understand laboratory management, maintenance and safety measures

- Ex. 1 Procedure for purchase of laboratory related items, inventory management
- Ex. 2 Supply of gas, electricity and water in a laboratory
- Ex. 3 Fire safety measures in a laboratory
- Ex. 4 Classification and handling of hazardous chemicals
- Ex. 5 Disposal of unserviceable and obsolete items
- Ex. 6 Safe disposal of laboratory wastes
- Ex. 7 Attending to emergency situation
- Ex. 8 Preparation of standard of oxalic acid solution
- Ex. 9 Determination of strength of NaOH
- Ex. 10 Preparation of stock solutions and dilution
- Ex. 11 Preparation of water and alcohol based reagents (Fehling A & B, starch solutions)
- Ex. 12 Preparation of distilled water
- Ex. 13 Preparation of buffer solution
- Ex. 14 Determination of pH using pH paper

Keywords- Inventory, unserviceable, obsolete, Fehling A& B, distilled water

Course outcome – By the end of this course student will be able to understand

- Familiarize with the basic facilities available in laboratory
- Expected to gain knowledge of the basic skills of organization and management of science laboratory.
- Enabled to develop skills in common laboratory technique
- Trained to adopt appropriate disposal procedure and safety methods suitable for Laboratory

INTERNALASSESSMENT**:** 40marks

Internalassessment	**Marks**	**Externalassessment**	**Marks**
ChemicalandLabsafety Class Interaction / Quiz	**10**	**Viva- Voce on Practical**	**10**
Attendance	**15**	**PracticalRecordFile**	**10**
Assignment (Charts/ model seminar/ Rural services/ Technology dissemination/ Report of Excursion/ Lab visits/ Survey/ Industrial visit)	**15**	**Table work/ Experiments**	**50**
TOTAL	**40**		**60**

Class	*CourseType*	*CourseCode*	*CourseTitle(Theory/Practical)*	*Marks*	
B.Sc.III Year	-------	**S3CHEM 2T**	Pharmaceutical and Medicinal Chemistry	Max: 100	Min: 35

General Objective:

- To enable the students to create and understanding about the laboratory practices, various laboratory techniques and analysis.
- To recognize safe laboratory practices, handling laboratory glassware, equipment, and chemical reagents.
- To enable the students to gain knowledge about inorganic and organic synthesis.

EXTERNALASSESSMENT:60marks

Course Content:

1. Synthesis of Acetanilide
2. Synthesis of Aspirine
3. Synthesis of tinchre Iodine
4. Synthesis of PotashAlum
5. Synthesis of Ferrous Ammonium Sulphate
6 Isolation of Caffein by tea leaves
7. Extraction of active constituent from solvent extraction method
8. Identification of crude drug
9. Morphology of turmeric, Ginger, Mentha
10. Preparation of suspension /Emulsions, Oil Mint
11. Synthesis of Milk of Magnesia
12. Preparation of simple Syrup as per IP and USP
13. Preparation of Pharmaceutical Buffer and study of it's the oretical and calculated pH
14. Preparation of Zinc Oxide
15. Calcium Carbonate
16. Synthesis of Oil of Winter Green
17. Synthesis of Oxalic acid

INTERNALASSESSMENT:40 marks

Course Outcomes: By the end of this course student will be able to understand

- How to prepare Acetanilide
- How to Synthesis various Drugs
- To learn about preparation of simple syrup as per IP and USP