M. Sc II (Organic Chemistry), Semester-III

PGOH-301: ADVANCED ORGANIC REACTION MECHANISM

Total Credits: 04 **Total Lectures: 60Hrs**

Course Learning Outcomes :

After completion of these courses students should be able to;

CO 1 : Study of carbanion-formation, stability and related name reaction
CO 2 : Understand the NGP.
CO 3 : Learn the carbenes and nitrenes.
CO 4 : Study of oxidative coupling and SNAr reaction.
CO 5 : Study of heterocyclic chemistry: Five and six member heterocyclic with one or two hetero atoms.
CO 6 : Study the synthesis, reactivity, aromatic character and importance of heterocyclic compounds.

Course Content:

Carbanions in Organic Chemistry

Ionization of carbon hydrogen bond and prototopy, base and acid catalysed halogenation ketones, keto-enol equilibria, Structure and rate in enolisation, Concerted and carbanion mechanis for tautomerism, Carbanion character in phenoxide and pyrrolyl anions, Geometry of carbanio Hydrolysis of haloforms, Aldol, Mannich, Cannizzaro, Darzens, Dieckmann, Claisen Bayl Hillman reactions, Knoevenagel, Benzoin Condensation, Alkylation of enolates.
Reactions of carbenes and nitrenes.

Heterocyclic Chemistry

Synthesis and reactions of : Furon, Pyrrole, Thiophene, Benzofuran, Indole, Benzothiphe Pyridine, Quinoline, Isoquinoline, Imidazole, Oxazole, Thiazole.

Synthesis of Chloroquine, Papavarine, Amlodipine, Bromouidine, Ranitidine, Vitamin-E Tryptophan, Thiamine, Histidine.

PGOH-302: SPECTORSCOPIC METHODS IN STUCTURE DETERMINATION

Total Credits: 04 **Total Lectures: 60Hrs**

Course Learning Outcomes :

At the end of course student will be able to –

CO 1 : Study ^{1}H NMR Spectroscopy: Chemical Shift, deshielding, correlation for protons bonded to carbon and other nuclei.

CO 2 : Study of ^{13}C NMR spectroscopy: FT- NMR, type of ^{13}C NMR spectra, proton decoupled , off resonance, Chemical shift, nuclear and hetero nuclear coupling constant

CO 3 : 2D NMR techniques: COSY, HETCOR and applications of PMR

CO 4 : Study of mass spectrometry: Instrumentation, various methods of ionization, EIMS, SIMS, FAB, MALDI. Different detectors rules of fragmentations of different functional groups.

CO 5 : To solve the problems based on joint application of UV, IR, NMR, CMR and Mass.

Course Content:

1.Recapitulation of UV, IR and ^{1}H NMR.

2. ^{1}H NMR

(Advanced ideas) FT – techniques, Spin Coupling, Ramsay mechanism of spin coupling, Different spin systems (AB, AX, AMX systems, Calculation of line intensities), Factors affecting coupling constants, Rate processes. Different types of coupling. Methods used for simplification of PMR spectra. NOE, Spin decoupling. Two dimensional (2D) NMR Techniques, COSY, HETCOR. Applications of PMR**.**

3. ^{13}C NMR

Elementary ideas, Instrumental problems, Chemical shift features of hydrocarbons, Effect of substituents on chemical shifts, Different type of carbons (alkene, alkyne, allene and carbonyl). DEPT(with 3 different angles), Application of ^{13}CNMR**.**

4. Mass Spectrometry

Theory, Instrumentation, Various methods of ionization (field ionisation, EIMS, SIMS, FAB, MALDI), Different detectors (magnetic analyzer, ion cyclotron analyzer, Quadrupole mass filter, Time of flight (TOF). Rules of fragmentation of different functional groups, Factors controlling fragmentation. Application of Mass spectroscopy**.**

5. Problems based on joint application of UV, IR, PMR, CMR, and Mass.

(Including reaction sequences)

PGOC-303: ADVANCED STEREOCHEMISTRY

Total Credits: 04 **Total Lectures: 60Hrs**

Course Learning Outcomes :

At the end of course student will be able to –

CO 1 : Study of stereochemistry of six member ring.
CO 2 : Learn the stereochemistry of rings other than six members.
CO 3 : Understand fused bridge and Caged rings.
CO 4 : Learn resolution of racemic modification, stereochemistry of organic compound using NMR.
CO 5 : Learn stereochemistry of Morphine, Quinine and Strychnine

Course Content:

1. Stereochemistry of rings other than six membered

2. Fused Bridged and Caged rings

3. Recapitulation of prochirality, Homotopic and Heterotopic ligands, Stereoselectivity in cyclic compounds, Enantioselectivity, Diastereoselectivity, Stereoselective aldol reactions. Cram's rule, Felkin Anh rule, Cram's chelate model. Asymmetric synthesis use of chiral auxiliaries, Chiral reagents and catalysts, Asymmetric hydrogenation, Asymmetric epoxidation and asymmetric dihydroxylation.

4. Stereochemistry of Morphine, Quinine and Strychnine

PGOC-304: MEDICINAL CHEMISTRY

Total Credits: 04 **Total Lectures: 60Hrs**

Course Learning Outcomes :
At the end of course student will be able to –

CO 1 : Analyse the important technology in medicinal chemistry.
CO 2 : Learn the medicinal chemistry, the action and discovery.
CO 3 : Discuss drug metabolism.
CO 4 : Study antimicrobial drugs.
CO 5 : Elaborate mechanism of action of antibiotic.

Course Content:

1: Concepts of Medicinal Chemistry.
Important terminology in medicinal chemistry: Drugs, Pharmacy, Pharmaceutics, Toxicology; Pharmacodynamic agents, Pharmacophore, Pharmacodynamics, metabolite and antimetabolites, chemotherapy. Mechanism of chemotherapeutic actions: 1) Biological defences 2) Chemical defences. a) Surface active agent, b) Metabolic antagonism. Assay of Drugs: Chemical assay, Biological assay, Immunological assay, LD-50 and ED-50.

2: Drug metabolism.
Introduction, Oxidation, Reduction, Hydrolysis, Conjugation.

3: Antimicobacterial drugs.
Introduction, First-line agents (Primary tubercular drugs): Structure and activity of streptomycin and dihydro-streptomycin, Synthesis and SAR of 4-amino salicylic acid and isoniazid.

4: Antibiotics. 1.
Introduction, classification of antibiotics,
2. Cell wall synthesis,
3. Mechanism of action of antibiotics, a) Inhibition of cell-wall synthesis, b) Inhibition of bacterial protein synthesis, c) Disorganization of the cytoplasmic membrane, d) Interference in the bacterial nucleic acid synthesis, e) Inhibition of the tetrahydro-folate biosynthesis.
4. Cell wall synthesis inhibitors (β-Lactam antibiotics): Synthesis of Penicillin-G, Amoxicillin, Aampicilin from 6-APA, Cephalexin, Structure and activity of benzyl penicillin, Semi-synthetic penicillin, Cephalosporin, Mode of action of penicillin and cephalosporin.

PGSEC-305- ASSESMENT OF WATER QUALITY

Total Credits: 04 **Total Lectures: 30Hrs**

Course Learning Outcomes :
At the end of course student will be able to –

CO 1 : Study the modern techniques of analysis of water for research and extension activity.
CO 2 : Use of instruments and their general maintenance.
CO 3 : Learn the interpretation of analytical data and formulation of reports/ recommendations.

Course Content:

The main objective of course is to improve the awareness and skills of the students in modern techniques of analysis of water for research and extension activities. Use of instruments and their general upkeep/maintenance, interpretation of analytical data and formulation of reports/recommendations.

The course is designed to cover water characteristics, testing techniques and methods of interpretation of data, so as to make it more useful in the context of global competition in quality and precision of analysis.. About the Course: The course will cover some theory lectures on topics most relevant to the subject along with appropriate number of practical exercises with greater emphasis on analytical techniques adopting a demonstration and learning-by-doing type of approach. Interpretation of test results and formulation of recommendations and/or reports will be a vital component.

The course context: Collect samples in scientific way from residential plumbing and municipal distribution systems for analysis Take physical tests like (Colour, pH, Temp etc) at the spot and use preservatives for further analysis Conduct chemical tests of samples in lab (e.g. Alkalinity, Hardness, TDS. DO, COD etc with biological tests) as possible as. To conduct chlorine residual or turbidity tests.

Compare the obtained values with WHO, CPCB or BSI Standards