Cross cutting issues – (Environment & Sustainability)

2018-19, 2019-20, 2020-21

B. Sc. Third Year: Semester-V
Paper-XII, (DSEC-V, Section A)
Organic & Inorganic Chemistry

Marks – 50 Periods – 45

Section – A (Organic Chemistry)

Unit – I Heterocyclic Compounds 06 Periods

i) Introduction, classification and nomenclature.
ii) Molecular orbital structures, resonance structures and reactivity of furan, pyrrole, thiophene and pyridine.
iii) General mechanism of electrophilic substitution reactions of furan, pyrrole, thiophene & pyridine.

[A] Five-membered heterocycles

(1) Furan: (Oxole)

1.1.1 Synthesis from: a) Mucic acid b) Succinaldehyde
1.1.2 Physical Properties
1.1.3 Chemical Properties:

a) Electrophilic Substitution reactions :
i) Nitration ii) Sulphonation iii) Halogenation
iv) Friedel-Craft's acylation v) Gattermann-Koch reaction
vi) Gomberg reaction vii) Reaction with n-butyl lithium
b) Reduction
c) Diel's-Alder reaction

(2) Pyrrole : (Azole)

1.2.1 Synthesis from: a) Acetylene b) Furan c) Succinimide
1.2.2 Physical properties
1.2.3 Chemical properties:

a) Electrophilic substitution reactions:
i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-craft acylation
v) Gattermann reaction vi) Reimer-Tiemann reaction vii) Coupling reaction
b) Reduction
c) Ring expansion reaction
d) Acidic character

(3) Thiophene (Thiole)

1.3.1 Synthesis from: a) Acetylene b) n-butane c) Sodium Succinate
1.3.2 Physical properties
1.3.3 Chemical properties

a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation
iv) Friedel-Craft acylation v) Chloromethylation vi) Mercuration vii) Reaction with n-butyl lithium
b) Reduction

Unit – II : [B] Six-membered heterocyclic compounds 04 periods

(1) Pyridine: (Azine)

2.1.1 Synthesis from: a) Acetylene b) β -picoline c) Pentamethylenediamine hydrochloride
2.1.2 Physical properties
2.1.3 Chemical properties:
a) Electrophilic Substitution reactions: i) Nitration ii) Sulphonation iii) Bromination
b) Nucleophilic Substitution reactions: (General mechanism)

i) Amination ii) Reaction with KOH iii) Reaction with n-butyl lithium
c) Reduction d) Oxidation e) Basic Character

[C] Condensed heterocyclic compounds:

(1) Indole : (Benzopyrrole) Synthesis by : a) Fischer's Indole Synthesis b) Bischler's Indole Synthesis

(2) Quinoline: (Benzopyridine) Synthesis by: a) Skraup Synthesis b) Friedlander Synthesis

PRINCIPAL
Nutan Mahavidyalaya
SELU, Dist. Parbhani

Scanned with OKEN Scanner

NUTAN MAHAVIDYALAYA SELU

Unit – III: Synthetic drugs and dyes 10 Periods

(1) Synthetic drugs:

3.1.1 Introduction: qualities of good drug

3.1.2 Classification of drugs based on therapeutic action :-

a) Functional drugs : (Antipyretics, Analgesics, Anaesthetics, Antidiabetics, Anti-inflammatory, sedatives, hypnotics, tranquillizers)

b) Chemotherapeutic agents : (Antimalarials, Antibacterials, Antifungals, Antituberculars,

3.1.3 Synthesis and uses of the following drugs:

a) Paludrine b) Paracetamol c) Sulphanilamide d) Aspirin

e) Benzocaine f) Isoniazide g) Sulphadiazine h) Tolbutamide

(2) Synthetic dyes:

3.2.1 Introduction, qualities of good dye

3.2.2 Classification of dyes based on methods of applications

3.2.3 Colour and chemical constitution: a) Witt's theory b) Armstrong's theory

3.2.4 Synthesis and uses of the following dyes:

a) Alizarin d) Methylorange

b) Diamond black-F e) Congo-Red

c) Indigo f) Orange – II

Unit – IV: Alkaloids, Vitamins and Pesticides 10 Periods

(1) Alkaloids:

4.1.1 Introduction, occurrence and extraction.

4.1.2 Classification and general properties.

4.1.3 Determination of chemical constitution of alkaloids.

4.1.4 Constitution of the following alkaloids.

a) Ephedrine : (Synthesis from : 1-Phenyl propane-1, 2-dione)

b) Nicotine : (Synthesis from : Nicotinonitrile)

(2) Vitamins :

4.2.1 Introduction and classification.

4.2.2 Source, structure and deficiency diseases of the following vitamins :

a) Vitamin – A, D, E and K

b) Vitamin – B_1, B_2, B_3, B_6, B_{12} and C

(3) Pesticides :

4.3.1 Introduction and classification :
(Insecticides, Herbicides, Fungicides and Rodenticides)

4.3.2 Synthesis and uses of the following pesticides :

a) DDT b) BHC c) 2, 4 – D d) Methoxychlor e) Carbaryl d) Monochrotophos

Section – B (Inrganic Chemistry)

Unit–V: Coordination Chemistry (Part-I) 10 Periods

5.1.1 Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound.

5.1.2 Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere.

5.1.3 Nomenclature: Rules of nomenclature of coordination compounds, and its applications to nomenclature of simple and bridging complex compounds.

5.1.4 Werner's theory of coordination compound, postulates, applications with reference to $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.4NH_3$, $CoCl_3.3NH_3$.

5.1.5 Chelating agents and its classification, difference between metal complex and metal chelate complex.

5.1.6 Isomerism: structural isomerism, ionization, hydrate, linkage, coordination isomerism, geometrical isomerism, optical isomerism in 4 and 6 coordination complex.

5.1.7 E. A. N. of metal complexes.

PRINCIPAL
Nutan Mahavidyalaya
SELU. Dist. Parbhani

Scanned with OKEN Scanner

B. Sc. Third Year: Semester-VI
(DSEC-VI, Section A)
(A1)
Organic & Inorganic Chemistry
Paper-XIV

Marks – 50 Periods – 45

Section – A (Organic Chemistry)

Unit – I Spectroscopic Methods: 08 Periods

i) Introduction, Electromagnetic radiations; Characteristics of EMR :- a) Wave length b) Wave number c) Frequency d) Energy of EMR
ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods.

(A) U. V. Spectroscopy:

1.1.1 Introduction.
1.1.2 Absorption of U.V.radiations : Beer-Lambert Law and Molar Absorption.
1.1.3 Types of Electronic Transitions.
1.1.4 Terms used in U.V.Spectroscopy : Chromophore, Auxochrome,Bathochromic. Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects.
1.1.5 Effect of conjugation on position of U.V. and Visible bands.
1.1.6 Calculation of λ max by Woodward – Fieser rules for conjugated dienes and enones.
1.1.7 Spectral problems based on U.V.

(B) I.R. Spectroscopy:

1.2.1 Introduction
1.2.2 Principle of IR Spectroscopy.
1.2.3 Fundamental Modes and types of Vibrations. Hooke's Law.
1.2.4 Conditions for absorption of IR-radiations.
1.2.5 IR Spectrum : Functional group region and Fingerprint region.
1.2.6 Characteristic absorption of various functional groups.
1.2.7 Interpretation of IR spectra of following organic compounds :

a) Ethane b) Ethene c) Ethyne d) Benzene e) 1-propanol f) 2-propanol
g) t-butyl alcohol h) Phenol i) Acetone j) Acetophenone k) Acetaldehyde
l) Benzaldehyde m) Benzoic acid n) Methylbenzoate o) Phenylcyanide

Unit – II:

(A) NMR – Spectroscopy: 08 Periods

2.1 Introduction
2.2 Principle of NMR Spectroscopy
2.3 Magnetic and non-magnetic nuclei
2.4 PMR-Spectroscopy :- Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance.
2.5 Equivalent and non-equivalent protons
2.6 Number of absorption singals in the following compounds :
a) Acetone b) Cyclobutane c) Methanol d) Ethylbenzene e) Ethyamine
f) Mesitylene g) Diethylether
2.7 Shielding and deshielding effects : (Example of Acetylene and Benzene)
2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale
2.9 TMS as reference, Advantages of TMS.
2.10 Peak area (integration) & spin-spin Splitting (n+1) rule
2.11 Definition of coupling constant : (J-values) of first order coupling
2.12 Interpretation of PMR Spectra of following compounds : a) Ethyl bromide b) Ethyl alcohol c) Acetaldehyde d) 1,1,2-tribromo ethane e) Ethyl acetate f) Toluene g) Acetophenone h) Ethylamine i) Acetic acid j) Benzoic acid

PRINCIPAL
Nutan Mahavidyalaya
SELU. Dist. Parbhani

Scanned with OKEN Scanner

(B) Problems pertaining to the structure elucidation of simple organic compounds using PMR- Spectrosopic data (Supporting IR and UV data to be given) 04 Periods

ORGANIC COMPOUNDS :

a) n-propyl alcohol	b) Iso-Propyl alcohol	c) ter.butyl alcohol	d) Acetic acid
e) Ethylamine	f) Ethyl cyanide	g) Ethyl methyl ketone	h) Ethyl acetate
i) Ethyl benzene	j) Phenyl acetaldehyde	k) Phenol	l) Ethyl methyl ether
m) Ethylene glycol	n) Propionamide	o) Propionaldehyde	

Unit – III: Amino acids and Peptides 06 Periods

(A) Amino Acids:

3.1.1 Introduction & classification (acidic, basic and netural).
3.1.2 Dipolar nature of amino acids : Zwitter ion, iso electric point.
3.1.3 Methods of Preparation of α -amino acids :
a) From α -halo acids b) By Gabriel's Phthalimide Synthesis c) By Strecker's Synthesis
3.1.4 Chemical Properties of α -amino acids :
a) Reactions due to $-NH_2$ group b) Reactions due to –COOH group
c) Reactions due to both $-NH_2$ and –COOH groups
3.1.5 Reagents used for identification of amino acids

(B) Peptides:

3.2.1 Introduction, classification and nomenclature
3.2.2 N-terminus and c-terminus protecting agents
3.2.3 Synthesis of peptides from amino acids : (di- & tri-)
a) By protecting – NH_2 group (Using carbobenzoxyl chloride)
b) By protecting – COOH group (Using benzyl alcohol)
3.2.4 Use of DCC (Dicyclohexyl Carbodiimide) as reagent for peptide bond formation

Unit – IV: Molecular Rearrangements 04 Periods 4.2.1 Introduction, classification of rearrangements: On the basis of migratory group (a)Electrophilic rearrangement (ex. Pinacole – Pinacolone rearrangement)

(b) Nucleophilic rearrangement (ex. Favroskii rearrangement)
(c)Free Radical rearrangement (ex. PhotoFries rearrangement)
(d)Aromatic rearrangement (ex Stevens rearrangement)

Section – B (Inorganic Chemistry)

10 Periods

Unit-V: Coordination theory (Part-II)

5.1.1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT.
5.1.2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planarcomplex.
Definition of CFSE, calculations of CFSE for octahedral and tetrahedralcomplexes.
5.1.3) Factors affecting 10 Dq or magnitude of crystal field splitting : Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes.
5.1.4) Applications of CFT.
5.1.5) John teller effect in octahedral complexes of Cu++.
5.1.6) Limitations of CFT.

Unit- VI: Electronic Spectra of Transition Metal complexes: 05 Periods

5.2.1) Types of electronic transition
5.2.2) Selection rule for d-d transistion
5.2.3) Spectroscopic ground state and spectro-chemical series
5.2.4) Orgel energy level diagram for d^1 and d^9 states
5.2.5) Discussion of electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion

Reference Books:

1) Organic chemistry by S.M.Mukherji, S.P.Singh, R.P.Kapoor (Vol. II & III)

PRINCIPAL
Nutan Mahavidyalay.
SELU. Dist. Parbhani

Scanned with OKEN Scanner

Cross cutting issue -
(Environment & sustainability)

2021-22, 2022-23

B. Sc. Third Year: Semester-V
Paper-XII, (DSEC-V, Section A)
Organic + Inorganic Chemistry

Marks – 50 Periods – 45

Section – A (Organic Chemistry)

Unit: I Heterocyclic Compounds — 06 Periods

Introduction, definition, nomenclature and classification.
Simple five membered heterocycles with one hetero atom: Furan, Thiophene and Pyrrole.
Aromatic character and molecular orbital picture of Furan, Thiophene and Pyrrole.
General mechanism of electrophilic substitution reaction with reactivity. Preparation and chemical properties of five membered heterocycles.

1) **Furan:** Synthesis from: a) Mucic acid b) Succinaldehyde. Physical Properties, Chemical Properties: Nitration, Gatterman-Koch reaction, Gomberg reaction, Diels-Alder reaction and Reduction reaction.
2) **Pyrrole:** Synthesis from: a) Furan b) Succinamide. Physical properties, Chemical Properties: Sulphonation, Gatterman Reaction, Reimer-Tiemann reaction, Ring Expansion, Coupling reaction and Reduction reaction.
3) **Thiophene:** Synthesis from: a) n-Butane b) Sodium Succinate, Physical properties. Chemical Properties: Halogenation, Chloromethylation, Mercuration, Reaction with n-Butyl Lithium and Reduction reaction.

Unit: II Six Membered Heterocycles: Pyridine — 04 Periods

Introduction, Nomenclature, Aromatic character, Basic character and comparison with Pyrrole, General Mechanism for electrophilic substitution reaction and nucleophilic substitution reaction
Synthesis from: a) Acetylene b) Pentamethylene diamine hydrochloride c) β-Picoline
Chemical Properties: Nitration, Sulphonation, Halogenation, reaction with KOH, Amination reaction.

Unit: III Synthetic Drugs and Dyes — 10 Periods

(1) **Synthetic Drugs:** Introduction, Definition of drugs, qualities of good drug, Classification of drugs based on therapeutic action.
a) Pharmacodynamic agents : Antipyretics, Analgesics, Anesthetics, Antidiabetics, Anti-inflammatory, sedatives, hypnotics and tranquillizers.
b) Chemotherapeutic agents: Antimalarials, Antibacterials, Antifungals, Antituberculars.
Synthesis and uses of the following drugs: a) Paracetamol b) Sulphanilamide c) Aspirin d)Benzocaine e) Isoniazide f)Sulphadiazine.

(2) **Synthetic Dyes:** Introduction, Definition of dyes qualities of good dye, Classification of dyes based on methods of applications, colour and chemical constitution: a) Witt's theory b) Armstrong's theory.

PRINCIPAL
Nutan Mahavidyalaya
SELU, Dist. Parbhani

Scanned with OKEN Scanner

Synthesis and applications of Azo dyes: methyl orange and congo red (mechanism of diazo coupling); Triphenylmethane dyes: malachite green and crystal violet; Phthalein dyes: Phenolphthalein and Fluorescein dye.

Unit: IV Alkaloids, Vitamins and Pesticides **10 Periods**

(1) **Alkaloids:** Introduction, occurrence and extraction, classification and general properties, determination of chemical constitution of alkaloids. Constitution and Synthesis of the following alkaloids.

a) Ephedrine: Synthesis from : 1-Phenyl propane-1, 2-dione

b) Nicotine : Synthesis from : Nicotinonitrile

(2) **Vitamins :** Introduction and classification, Source, structure and deficiency diseases of the following vitamins:

a) Vitamin A, D, E and K (Fat Soluble)

b) Vitamin B_1, B_2, B_3, B_6, B_{12} and C (Water Soluble)

(3) **Pesticides:** Introduction and classification: Insecticides, Herbicides, Fungicides and Rodenticides. Synthesis and technical manufacture and uses of representative pesticides in the following classes : Organochlorines(DDT, Gammexene,); Organophosphates (Malathion), Carbamates (Carbaryl), Quinones (Chloranil), Anilides (Alachlor).

Section – B (Inrganic Chemistry)

Unit–V: Coordination Chemistry (Part-I) **10 Periods**

1) Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound.
2) Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere.
3) Nomenclature: Rules of nomenclature of coordination compound, and its applications to nomenclature of simple and bridging complex compounds.
4) Werner's theory of coordination compound, postulates, applications with reference to $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.4NH_3$, $CoCl_3.3NH_3$.
5) Chelating agents and its classification, difference between metal complex and metal chelate complex.
6) Isomerism: Structural isomerism, ionization, hydrate, linkage, coordination isomerism, Geometrical isomerism, optical isomerism in 4 and 6 coordination complex.
7) E. A. N. of metal complexes.

Unit-VI: The Chemistry Of Elements In Medicine **05 Periods**

1) Introduction
2) Chelation Therapy
3) Cancer Treatment
4) Anti-arthritis drugs.
5) Imaging agents.

Reference Books:

1) Organic chemistry by S.M.Mukherji, S.P.Singh, R.P.Kapoor (Vol. II & III)
2) Organic Chemistry by Jagdamba Singh, L.D.S.Yadav (Vol. II & III)
3) A text book of organic chemistry by P.L.Soni, H.M.Chawla
4) A text book of organic chemistry by K.S.Tewari, S.N.Mehrotra, N.K.Vishnoi
5) A text book of organic chemistry by ArunBahl and B.S.Bahl
6) Principles of organic chemistry by M.K.Jain
7) Heterocyclic chemistry synthesis, reactions and mechanism by Raj K. Bansal
8) Reaction mechanism and reagents in organic chemistry by G.R.Chatwal
9) Synthetic organic chemistry by G.R.Chatwal

NUTAN MAHAVIDYALAYA SELU

PRINCIPAL
Nutan Mahavidyalaya
SELU. Dist. Parbhani

Scanned with OKEN Scanner

Practical paper (Semester- V &VIth)
DSECP-IV
DSEC V & VIth (Section-A)
Organic + Inorganic Chemistry
Paper No. : P-XVI

Periods – 120 Laboratory Course – IV (CH-305) Mark 50

Note: **At least Sixteen experiments to be completed: (Twelve from Section A and four from Section B)**

Section – A (Organic Chemistry)

01. Organic qualitative analysis: (Seven mixtures)

Separation of organic binary mixture containing two solid components (Using NaHCO3, NaOH and HCl) and analysis of (both/one) components with preparation one derivative of each.

At least one mixture from each of the following types should be given:

a) Acid + Phenol b) Acid + Base
c) Acid + Neutral d) Phenol + Base
e) Phenol + Neutral f) Base + Neutral

Following compounds should be used for preparation of mixtures:

A] Acids : Salicylic acid, Phenyl acetic acid, o-Chlorobenzoic acid, aspirin, ophthalmic acid cinnamic acid, Benzoic acid, m-cholorobenzoic acid.

B] Phenols: α -naphtha, β -naphtha, Resorcinol, p-nitro phenol, m-nitro phenol, Hydroquinone,

C] Bases : o-nitroaniline, m-nitroaniline, p-nitroaniline, p-anisidine, diphenylamine, p-Toluidine, p-chloroaniline

D] Neutrals: Acetanilide, Anthracene, Benzamide, Benzophenone, Biphenyl, Naphthalene, m-Dinitrobenzene, p-Dichloro benzene

02. Organic Preparation: (Any five)

[Weight of crude product, crude % yield, recrystallisation of crude product and its melting point expected]

a) Acetylation: Preparation of Aspirin from salicylic acid

OR

Preparation of β -naphtyl acetate from β -naphthol

b) Electrophilic substitution:

Preparation of p-nitroacetanilide from acetanilide (Nitration)

Preparation of 2, 4, 6 – Tribromoaniline from aniline (Bromination)

OR

Preparation of p-bromo acetanilide from acetanilide (Bromination)

c) Diazotisation : Preparation of Methylorange from sulphanilic acid (Coupling)

OR

Preparation of p-iodonitrobenzene from p-nitroaniline (Replacement)

Benzoylation : Preparation of β -naphtyl benzoate from β -naphthol

OR

Preparation of Benzanilide from aniline

e) Osazone formation: Preparation of Glucosazone from Glucose

f) Amide Formation: Preparation of Benzamide from benzoic acid

g) Hydrolysis: Preparation of p-nitroaniline from p-nitroacetanilide

h) Reduction: Preparation of m-nitroaniline from m-Dinitrobenzene

i) Oxidation: Preparation of Benzoic acid from Toluene

j) Polymerisation: Preparation of phenol formaldehyde resin

PRINCIPAL
Nutan Mahavidyalaya
SELU, Dist. Parbhani

Scanned with OKEN Scanner

03. Only demonstrations:

a) Extraction of clove oil from crushed cloves by steam distillation.
b) Separation of a mixture of methyl orange and methylene blue by column chromatography
c) Separation of a mixture of amino acids by ascending paper chromatography.
d) Separation of various pigments in the extract of spinach leaves by TLC.

Section – B (Inorganic Chemistry)

1. Gravimetric estimation of Iron as Fe_2O_3.
2. Gravimetric estimation of Ba as $BaSO_4$
3. Gravimetric estimation of Nickel as $Ni(DMG)_2$.
4. Gravimetric estimation of Aluminium as $Al(Oxinate)_3$.
5. Gravimetric estimation of zinc as ZnO
6. Gravimetric estimation of Chloride as AgCl

Reference Books:

1) Practical organic chemistry by A.I.Vogel
2) Advanced practical organic chemistry by O.P.Agarwal
3) Advanced practical organic chemistry by N.K.Vishnoi
4) Hand book of organic qualitative analysis by H.T.Clarke
5) Experimental practical organic chemistry by P.R.Singh, D.S.Gupta
6) A laboratory Hand book of organic qualitative analysis by V.S.Kulkarni
7) Hand book of organic qualitative analysis by F.G.Mann, B.C.Sunders
8) A text book of Practical Chemistry for B.Sc. by V.V. Nadkarni, A.N. Kothare and Y.V. Lawande.
9) Advanced practical Inorganic Chemistry by O.P. Agarwal.

PRINCIPAL
Nutan Mahavidyalaya
SELU. Dist. Parbhani

Scanned with OKEN Scanner

B. Sc. Third Year: Semester-VI
(DSEC-VI, Section A)
(A_1)
Organic & Inorganic Chemistry
Paper-XIV

Marks – 50 **Periods – 45**

Section – A (Organic Chemistry)

Unit-I: Spectroscopic Methods: **08 Periods**

i) Introduction, Electromagnetic radiations; Characteristics of EMR: a) Wave length b) Wave number, c) Frequency, d) Energy of EMR.

ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods.

(A) Ultraviolet Spectroscopy:

1.1.1 Introduction.
1.1.2 Types of Electronic Transitions.
1.1.3 Terms used in UVSpectroscopy: Chromophore, Auxochrome, Bathochromic Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects.
1.1.4 Effect of conjugation on position of UV and Visible bands.
1.1.5 Calculation of λ_{max} by Woodward-Fieser rules for conjugated dienes and enones.
1.1.6 Spectral problems based on UV.

(B) Infra-Red Spectroscopy:

1.2.1Introduction.
1.2.2 Theory of molecular vibrations (Basic Principles and Types of Vibrations).
1.2.3 Functional group region and Fingerprint region.
1.2.5 Characteristic absorption of various functional groups.
1.2.6 Interpretation of IR spectra of following organic compounds: a) Ethane, b) Ethene, c) Ethyne, d) Benzene, e) 1-Propanol, f) 2-Propanol, g) t-Butyl alcohol, h) Phenol, i) Acetone, j) Acetophenone, k) Acetaldehyde, l) Benzaldehyde, m) Benzoic acid, n) Methylbenzoate and o) Phenylcyanide.

Unit – II: **08 Periods**

(A) NMR-Spectroscopy:

2.1 Introduction
2.2 Principle of NMR Spectroscopy
2.3 Magnetic and non-magnetic nuclei
2.4 PMR-Spectroscopy:Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance.
2.5 Equivalent and non-equivalent protons.
2.6 Number of absorption signals in the following compounds:a) Acetone, b) Cyclobutane, c) Methanol, d) Ethylbenzene, e) Ethyamine, f) Mesitylene, g) Diethylether,
2.7 Shielding and deshielding effects: (Example of Acetylene and Benzene)
2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale
2.9 TMS as reference, Advantages of TMS.
2.10 Peak area (integration) andSpin-spin splitting (n+1) rule.
2.11 Interpretation of PMR Spectra of following compounds: a) Ethyl bromide, b) Ethyl alcohol, c) Acetaldehyde, d) 1,1,2-tribromo ethane, e) Ethyl acetate, f) Toluene, g) Acetophenone, h) Ethylamine, i) Acetic acid, j) Benzoic acid.

(B) Applications of IR, UV and NMR for identification of simple organic molecules: 04 Periods

OrganicMolecules: a) n-Propyl alcohol, b) *iso*-Propyl alcohol, c) *tert*-Butyl alcohol, d) Acetic acid, e) Ethylamine, f) Ethyl cyanide, g) Ethyl methyl ketone, h) Ethyl acetate, i) Ethyl benzene, j) Phenyl acetaldehyde, k) Phenol, l) Ethyl methyl ether, m) Ethylene glycol, n) Propionamide and o) Propionaldehyde.

Scanned with OKEN Scanner

B. Sc. Third Year: Semester-VI
(DSEC-VI, Section A)
(A_1)
Organic & Inorganic Chemistry
Paper-XIV

Marks – 50 **Periods – 45**

Section – A (Organic Chemistry)

08 Periods

Unit-I: Spectroscopic Methods:

i) Introduction, Electromagnetic radiations; Characteristics of EMR: a) Wave length b) Wave number, c) Frequency, d) Energy of EMR.

ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods.

(A) Ultraviolet Spectroscopy:

1.1.1 Introduction.
1.1.2 Types of Electronic Transitions.
1.1.3 Terms used in UVSpectroscopy: Chromophore, Auxochrome, Bathochromic Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects.
1.1.4 Effect of conjugation on position of UV and Visible bands.
1.1.5 Calculation of λ_{max} by Woodward-Fieser rules for conjugated dienes and enones.
1.1.6 Spectral problems based on UV.

(B) Infra-Red Spectroscopy:

1.2.1Introduction.
1.2.2 Theory of molecular vibrations (Basic Principles and Types of Vibrations).
1.2.3 Functional group region and Fingerprint region.
1.2.5 Characteristic absorption of various functional groups.
1.2.6 Interpretation of IR spectra of following organic compounds: a) Ethane, b) Ethene, c) Ethyne, d) Benzene, e) 1-Propanol, f) 2-Propanol, g) t-Butyl alcohol, h) Phenol, i) Acetone, j) Acetophenone, k) Acetaldehyde, l) Benzaldehyde, m) Benzoic acid, n) Methylbenzoate and o) Phenylcyanide.

Unit – II: **08 Periods**

(A) NMR-Spectroscopy:

2.1 Introduction
2.2 Principle of NMR Spectroscopy
2.3 Magnetic and non-magnetic nuclei
2.4 PMR-Spectroscopy:Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance.
2.5 Equivalent and non-equivalent protons.
2.6 Number of absorption signals in the following compounds:a) Acetone, b) Cyclobutane, c) Methanol, d) Ethylbenzene, e) Ethyamine, f) Mesitylene, g) Diethylether,
2.7 Shielding and deshielding effects: (Example of Acetylene and Benzene)
2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale
2.9 TMS as reference, Advantages of TMS.
2.10 Peak area (integration) andSpin-spin splitting (n+1) rule.
2.11 Interpretation of PMR Spectra of following compounds: a) Ethyl bromide, b) Ethyl alcohol, c) Acetaldehyde, d) 1,1,2-tribromo ethane, e) Ethyl acetate, f) Toluene, g) Acetophenone, h) Ethylamine, i) Acetic acid, j) Benzoic acid.

(B) Applications of IR, UV and NMR for identification of simple organic molecules: 04 Periods

OrganicMolecules: a) n-Propyl alcohol, b) *iso*-Propyl alcohol, c) *tert*-Butyl alcohol, d) Acetic acid, e) Ethylamine, f) Ethyl cyanide, g) Ethyl methyl ketone, h) Ethyl acetate, i) Ethyl benzene, j) Phenyl acetaldehyde, k) Phenol, l) Ethyl methyl ether, m) Ethylene glycol, n) Propionamide and o) Propionaldehyde.

PRINCIPAL
Nutan Mahavidyalaya
SELU, Dist. Parbhani

Scanned with OKEN Scanner