



M.Sc. Part –II Semester (IV)

Year: 2020-21

Organic Chemistry

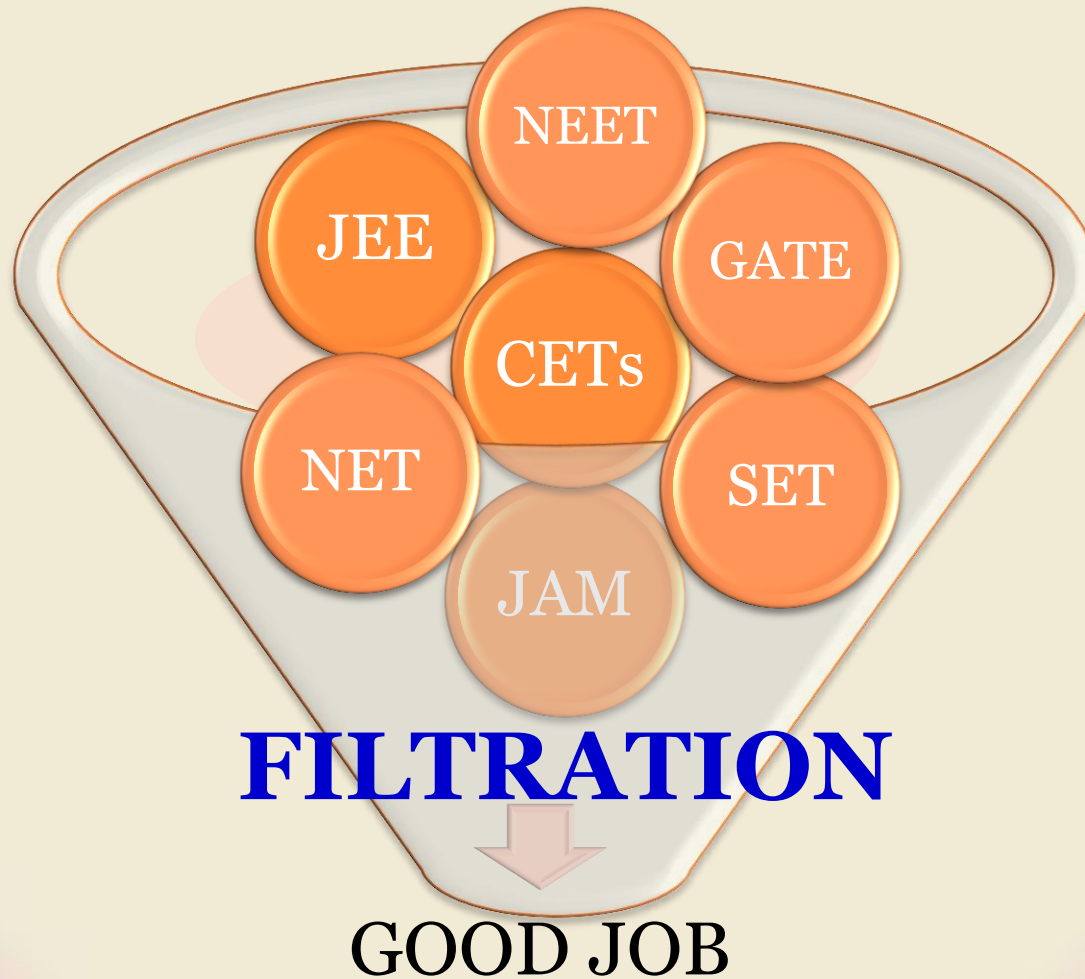
Online Teaching

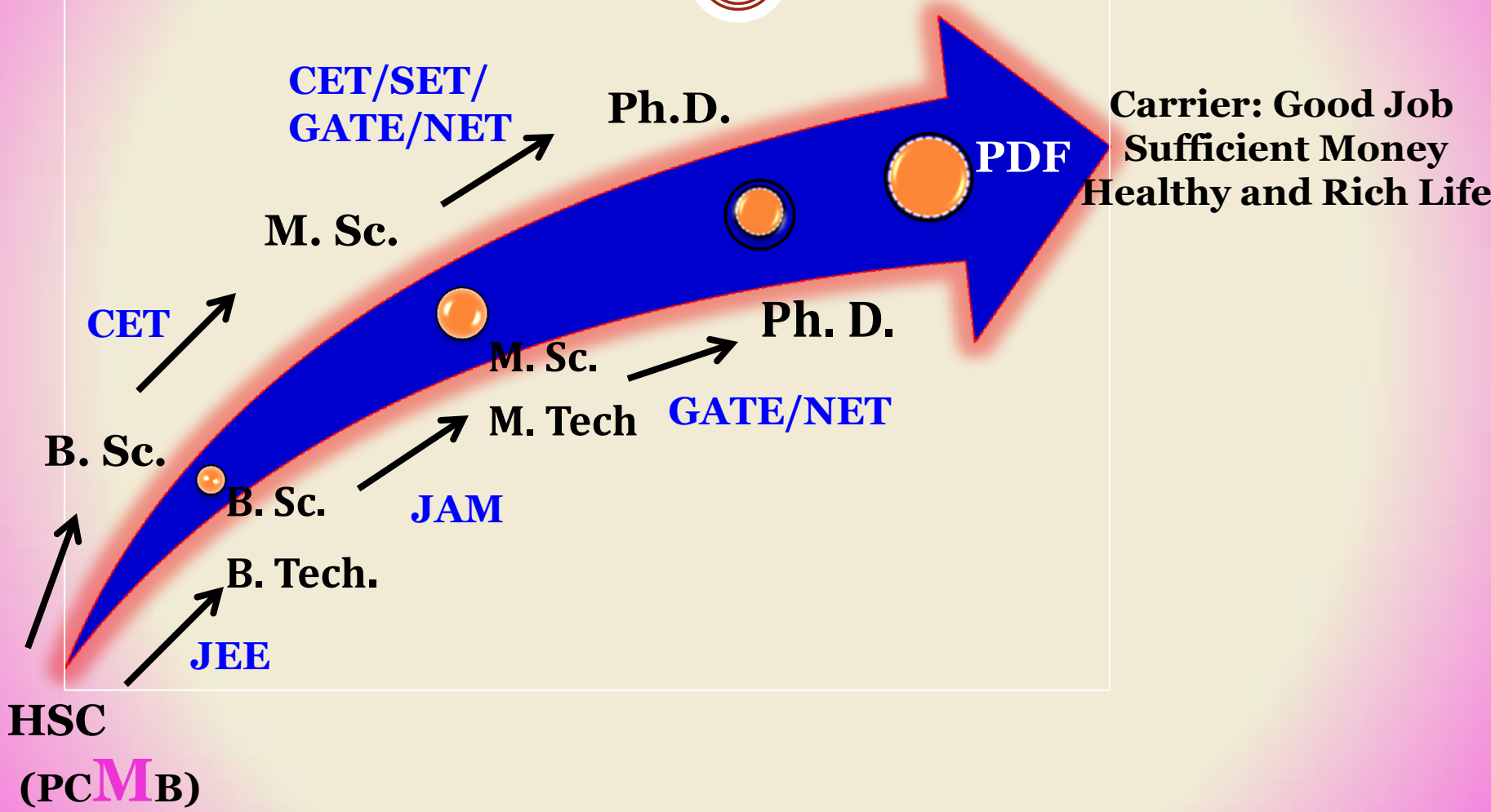
Fundamentals: Scope, Overview and Importance

Dr. Arjun S. Kumbhar
Department of Chemistry
P.D.V.P. College, Tasgaon

Filtration: Common Way to Get Good Job

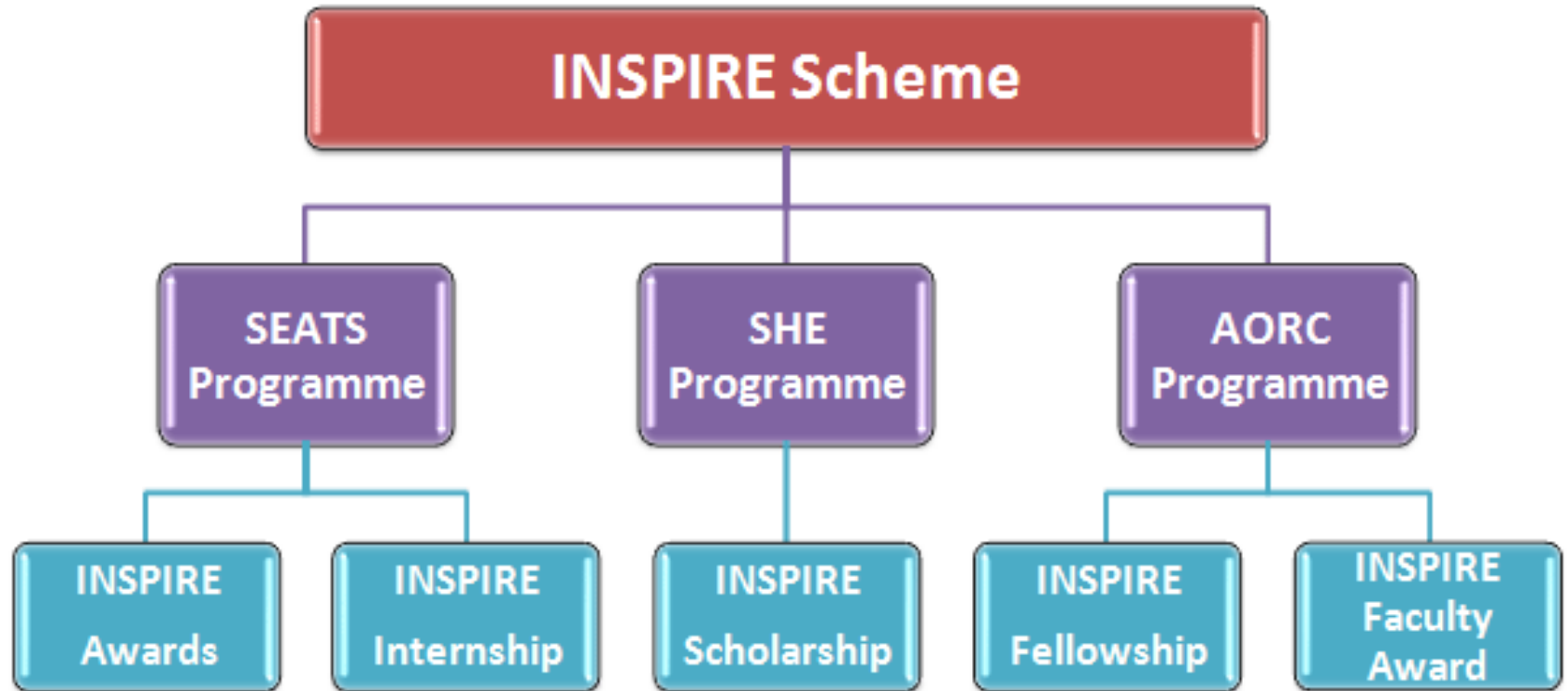
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DST-Inspire Scheme

4



SEATS : Scheme for **E**arly **A**ttraction of **T**alent

SHE : Scholarship for **H**igher **E**ducation

AORC : Assured **O**pportunity for **R**esearch **C**areers

Shivaji University, Kolhapur: CBCS Syllabus Chemistry

M.Sc. Part –I Semester (I and II)

To be implemented from June – 2020-21

	Course code	Paper No.		Title of course	Topics to be not considered for examination
CGPA	CC-401	XIII	OCH 4.1	Theoretical Organic Chemistry	Unit IV: B) Non-classical carbocations: Formation, stability and reactivity.
	CCS-402	XIV	OCH 4.2	Stereochemistry	Unit IV: (C) O.R.D. and C.D.
	CCS-403	XV	OCH 4.3	Chemistry of Natural Products	Unit IV: C) Vitamins:
	DSE-404(A)	XVI(A)	OCH 4.4(A)	Applied Organic Chemistry	Unit IV: Polymer processing, Plasticizers and anti -oxidants for polymers,
	DSE-404(B)	XVI(B)	OCH 4.4(B)	Bioorganic Chemistry	Unit IV: The chemical basis for heredity, an overview of replication of DNA, transcription, translation and genetic code. Chemical synthesis of mono and poly nucleosides.

- Theory : 400 + 400 (100 marks Paper/Semester)
- Practical : 200
- Total : 1000
- Pattern of examination: 80:20

Papers	Units	Syllabus	Name of Teacher	Periods
Paper-XIII	Theoretical Organic Chemistry			
	Unit-I:	Molecular Orbital Theory	Mr. A. A. Jagdale	15
	Unit-II:	Non-benzenoid aromatic Compounds	Ms. S. R. Mali	15
	Unit- III:	Green Chemistry	Mr. U. R. Shivpuje	15
	Unit-IV:	a) Kinetic and thermodynamic control of reactions b) Non-classical Carbocation	Dr. S. K. Shinde	15
Paper-XIV	Stereochemistry			
	Unit-I:	Conformational analysis and reactivity of acyclic and alicyclic compounds	Dr. A. S. Kumbhar	15
	Unit-II:	Conformational analysis and reactivity of cyclic compounds other than six membered	Dr. S. K. Shinde	15
	Unit-III:	Stereoselective synthesis	Dr. S. K. Shinde	15
	Unit- IV:	Stereochemistry of compounds containing no chiral carbon atoms and diastereoisomerism, ORD and CD	Dr. S. K. Shinde	15
Paper-XV	Chemistry of Natural Products			
	Unit-I:	a) Introduction of natural products b) Terpenoids	Mr. U. R. Shivpuje	15
	Unit-II:	Alkaloids	Ms. S. R. Mali	15
	Unit-III:	Steroids	Mr. A. A. Jagdale	15
	Unit-IV:	a) Prostaglandins, b) Lipids, c) Vitamins	Mr. A. A. Jagdale	15
Paper-XVI(A)	Applied Organic Chemistry			
	Unit-I:	Agrochemical	Ms. S. R. Mali	15
	Unit-II:	a) Synthesis and applications of perfumery b) Synthesis and applications of pharmaceuticals c) Sugarbased Chemicals	Ms. S. R. Mali	15
	Unit-III:	Dyes and Intermediates	Mr. U. R. Shivpuje	15
	Unit-IV:	Polymers	Mr. A. A. Jagdale	15

Semester IV

	Course code	Paper No.		Title of course	Topics to be not considered for examination
CGPA	CC-401	XIII	OCH 4.1	Theoretical Organic Chemistry	Unit IV: B) Non-classical carbocations: Formation, stability and reactivity.
	CCS-402	XIV	OCH 4.2	Stereochemistry	Unit IV: (C) O.R.D. and C.D.
	CCS-403	XV	OCH 4.3	Chemistry of Natural Products	Unit IV: C) Vitamins:
	DSE-404(A)	XVI(A)	OCH 4.4(A)	Applied Organic Chemistry	Unit IV: Polymer processing, Plasticizers and anti -oxidants for polymers,
	DSE-404(B)	XVI(B)	OCH 4.4(B)	Bioorganic Chemistry	Unit IV: The chemical basis for heredity, an overview of replication of DNA, transcription, translation and genetic code. Chemical synthesis of mono and poly nucleosides.

M. Sc. Part – II (Organic Chemistry)

Semester III

	Course code	Paper No.		Title of course	
CGPA	CC-301	IX	OCH 3.1	Organic Reaction Mechanism	Compulsory course
	CCS-302	X	OCH 3.2	Advanced Spectroscopic Methods	Compulsory course
	CCS-303	XI	OCH 3.3	Advanced Synthetic Methods	Compulsory course
	DSE-304(A)	XII(A)	OCH 3.4(A)	Drugs and Heterocycles	Choose any one
	DSE-304(B)	XII(B)	OCH 3.4(B)	Polymer Chemistry	Choose any one
	CCPR-305		OCHP 3.1	Practical –III	Compulsory course
Non-CGPA	AEC-306				
	EC(SWMMOOC)-307				

	Course code	Paper No.		Title of course	
CGPA	CC-401	XIII	OCH 4.1	Theoretical Organic Chemistry	Compulsory course
	CCS-402	XIV	OCH 4.2	Stereochemistry	Compulsory course
	CCS-403	XV	OCH 4.3	Chemistry of Natural Products	Compulsory course
	DSE-404(A)	XVI(A)	OCH 4.4(A)	Applied Organic Chemistry	Choose any one
	DSE-404(B)	XVI(B)	OCH 4.4(B)	Bioorganic Chemistry	Choose any one
	CCPR-405		OCHP 4.1	Practical –IV	Compulsory course
Non-CGPA	SEC-406				
	GE-407				

Semester IV

Paper No.- XIII, OCH 4.1: THEORETICAL ORGANIC CHEMISTRY

UNIT-I: Molecular Orbital Theory (15)

Aromaticity in benzenoids, alternant and non alternant hydrocarbon, Huckels rule, energy level of pi- molecular orbital and concept of aromaticity, calculation of energies of orbitals cyclic and acyclic systems. Determination energies and stabilities of different systems calculation of charge densities PMO theory and reactivity index.

UNIT – II: Non benzenoid aromatic Compounds (15)

Aromaticity in Non- benzenoids compounds Annulenes and heteroannulenes, fullerenes, azulene, fulvene, tropylium salts, ferrocene, five membered systems. Crown ether complexes, cyclodextrins, cryptands, catenanes and rotaxanes, bonding in fullerenes.

UNIT – III: Green chemistry (15)

Introduction to the principles of green chemistry – prevention of waste, atom economy, less hazardous chemical syntheses, designing safer chemicals, safer solvents and auxiliaries, design for energy efficiency, reduce derivatives, renewable feedstock, catalysis, design for degradation, real time analysis for pollution prevention, and inherently safer chemistry for accident prevention. Green synthesis, clean routes using supercritical solvents, ionic liquids and water.

UNIT – IV A) Kinetic and thermodynamic control of reactions (9)

Nitration and Sulphonation of naphthalene, Wittig, Enolization, Friedel-Crafts and Diels Alder reactions.

B) Non-classical carbocations: Formation, stability and reactivity. (6)

Paper No. – XV, OCH 4.3: CHEMISTRY OF NATURAL PRODUCTS

UNIT-I:

(15)

A) Introduction of natural products and Terpenoids: Introduction of natural products: Classification and isolation methods. Terpenoids: Structure and synthesis of camphor, carvone, abietic acid, zingiberene, α -santonin, β -cuparenone. Biogenesis of abietic acid.

UNIT-II:

(15)

Alkaloids: Structure, stereochemistry, synthesis and biosynthesis of the following: Morphine, Reserpine, Papaverine and Lysergic acid. Biogenesis of Coniine.

UNIT-III:

(15)

Steroids: Occurrence, nomenclature, basic skeleton, Diels hydrocarbon.

Study of the following: hormones (Structure and synthesis): Cholesterol, Androsterone, Testosterone, Estrone, Progesterone, Aldosterone and cortisone Bile acid (only synthesis) and biosynthesis of lanosterol.

UNIT-IV:

A) Prostaglandins: Occurrence, nomenclature, classification, biogenesis and physiological effects, Synthesis of PGE₂ and PGF₂. **(05)**

B) Lipids: Classification, Role of Lipids, Fatty acids and glycerol derived from oils and fats. **(04)**

C) Vitamins: Synthesis and structure of biotin, vitamin B₁ and B₂, Biological functions of Vitamin B₆, D and E. **(06)**

Paper No. - XVI (A), OCH 4.4(A): APPLIED ORGANIC CHEMISTRY

UNIT-I: (15)

A) Agrochemicals

a. Organochlorine pesticides: Introduction, synthesis and mode of action of endrin, aldrin, dieldrin.

b. Herbicides: Synthesis and mode of action of Triazines, triazoles, pyridazinones and Bipyridylum compounds: diquat, paraquat.

f. Juvenile hormone: introduction & structures JHA importance synthesis, IPM (08)

B) Synthesis and applications of perfumery

2-Phenylethanol, vanillin and other food flavours, synthetic musk and ionones. (07)

UNIT- II Unit Processes (15)

Introduction, Nitration of hydrocarbons, Bercamp reduction, halogenations, sulphonation of aromatic compounds.

UNIT-III: Dyes and Intermediates

(15)

Classification and synthesis of important dye intermediates by using nitration, sulphonation, diazotization reactions. Synthesis of Nitro dyes, xanthenes, reactive dyes, Fluorescent brightening agents, thermal sensitive dyes, dispersed dyes and reactive dyes.

UNIT-IV: Polymers

(15)

Mechanism of polymerization. Industrial process for synthesis of polyethylene, acrylonitrile, acrylate and methacrylate polymer, biomedical polymer, Polymer processing, Plasticizers and anti-oxidants for polymers,

4. Project: Literature survey. Study of reactions, synthesis, mechanism, isolation of natural products, standardization of reaction conditions, use of new methods etc. Identification of organic compounds by spectroscopic methods. External and internal examiners will examine the project (50 Marks) jointly at the time of practical examination.

SushantUniversity
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Centre for Research in collaboration with Elsevier
is conducting an online workshop on:

“Learning Fundamentals of Publishing in Quality Journals”



TOPICS:

- Understanding Researcher Issues
 - Publishing Workflow
 - How to find high impact journals,
 - Understanding Editor's mindset
 - How to write research articles effectively
- Read
Quality_ Publish Quality: Science Direct.

Wednesday, 26th May 2021, 2:30 PM | Venue : Online



Speaker : Vishal Gupta
Senior Customer
Consultant, South Asia
ELSEVIER - A Division of RELX
India Pvt. Ltd.



Convener: Dr. Monika Khurana
Associate Professor,
PhD Programme Coordinator,
Outgoing Coordinator,
Sushant University
Gurugram.

[Registration Link : CLICK HERE](#)

Sushant University, Golf Course Road, Sector-55, Gurgaon
Toll Free: 1800 270 55201 | www.sushantuniversity.edu.in | admissions@sushantuniversity.edu.in

Stereochemistry

Unit-I:	Conformational analysis and reactivity of acyclic and alicyclic compounds
Unit-II:	Conformational analysis and reactivity of cyclic compounds other than six membered
Unit-III:	Stereoselective synthesis
Unit- IV:	Stereochemistry of compounds containing no chiral carbon atoms and diastereoisomerism, ORD and CD

B Sc -I

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Types of Stereoisomerism,

**Optical Isomerism: Concept of Chirality,
Elements of Symmetry**

**Optical Isomerism in tartaric acid, 2, 3
Dihydroxybutanoic acid,**

**Enantiomerism, Diastereomerism and Meso
compounds,**

**Geometrical isomerism in C=C, C=N and alicyclic
compounds.**

**Nomenclature of stereoisomers: D and L, erythro and
threo, R and S, E and Z.**

B Sc -II

5.1 Introduction

5.2 Concept of Isomerism

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5.3 Types of Isomers and Isomerism

5.4 Representation of Conformations of Ethane by (Wedge Formula, Newman, Sawhorse and Fischer Representations)

5.5 Conformation of Alkanes

5.5.1 General

5.5.2 Conformational Analysis

5.5.3 Conformational Analysis of Ethane

5.5.4 Conformation Analysis of n-butane

**5.5 Relative Stabilities of Conformations
(The Potential Energy Diagram)**

5.6 Stability and conformations of cyclohexane

5.6.1 Stability of Cyclohexane

5.6.2 Conformational Analysis of Cyclohexane

**5.7 Conformations Analysis of Monosubstituted
Cyclohexanes**

5.8 Locking of Conformation in t-butyl Cyclohexane

Paper No. – XIV, OCH 4.2: STEREOCHEMISTRY

UNIT- I:

Conformational analysis and reactivity of acyclic and alicyclic compounds (15 h)

(A) Conformational analysis of acyclic compounds (4 h)

The difference between configuration and conformation. Klyne-Prelog terminology for torsion strain, Pitzer strain, van der Waals interactions, hydrogen bonding, and gauche effect. Conformations of 2, 3-dimethylbutane, 1,2-dihaloethanes, ephedrine.

(B) Conformational analysis of cyclohexane derivatives (4 h)

Concept of Baeyer ring strain, ring inversion, locking groups. Conformations of (1, 4-di-*t*-butyl)cyclohexane, 1, 4-cyclohexanediol, menthol, cyclohexanone.

(C) Effect of conformation on reactivity (mechanism) of acyclic and cyclic systems (7 h)

Curtin-Hammett principle. Effect of conformation on the course and rate of reactions in cyclohexane; debromination of 2,3-dibromobutane, semipinacolic deamination of 1,2-diphenyl-1-(*p*-chlorophenyl)-2-amino ethanol, dehydrohalogenation of stilbene dihalide and bromo-1,2-diphenyl propane, stereochemistry of molecular rearrangements; pyrolytic *cis*-elimination.

UNIT- II: Conformational analysis and reactivity of cyclic compounds other than six membered **(15 h)**

(A) Fused rings **(10 h)**

Types of fused ring systems; (a) Fused bicycles: cis and trans-decalins, octalins, decalols,(b)

Fused polybicycles: perhydroanthracene,

(B) Bridged rings **(5 h)**

Types of bridged ring systems, nomenclature, bridged bicycles: heptanes and octane, stereo chemical restrictions, Bredt's rule.

UNIT III: Stereoselective synthesis

(15 h)

(A) Stereoselective addition of nucleophiles to carbonyl group: Cram's rule, Felkin Ahn rule, Houk model, Cram's chelate model. Asymmetric synthesis by use of chiral auxiliaries. Nucleophilic addition: use of chiral substrates, auxiliaries, reagents and catalysts

(B) Asymmetric Oxidations: Asymmetric epoxidation of allylic alcohols (Sharpless Epoxidation), dihydroxylation of olefins (Sharpless asymmetric dihydroxylation, Upjohn process, Milas hydroxylation).

(C) Asymmetric Diels-Alder Reactions using chiral Lewis acids: Chiral bisulfonamides (Corey's catalyst).

UNIT-IV: Stereochemistry of compounds containing no chiral carbon atoms (15 h)

(A) Stereochemistry of allens, spirans and biphenyls, assignment of configuration (4 h)

(B) Configuration of diastereomers: Geometrical isomerism based on physical and chemical methods. (4 h)

(C) O.R.D. and C.D. (7 h)

ORD and CD curves with Cotton effect. Empirical and semi-empirical rules; The octant rule, helicity rule, Lowe's rule, and axial haloketone rule.

RECOMMENDED BOOKS:

1. E.L. Eliel: Stereochemistry of carbon compounds.
2. D. Nasipuri : Stereochemistry of organic compounds
3. P.S. Kalsi: Stereochemistry, Conformation and Mechanism.
4. Eliel, Allinger, Angyal and Morrison: Conformational analysis.
5. Hallas: Organic stereochemistry
6. Mislow and Benjamin: Introduction to Stereochemistry.
7. H. Kagan: Organic stereochemistry.
8. Carl Djerassi; Optical Rotatory Dispersion.
9. P. Crabbe : Optical Rotatory Dispersion and C.D.

Paper No. – XIV, OCH 4.2: STEREOCHEMISTRY

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Conformational analysis and reactivity of acyclic and alicyclic compounds (15 h)

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