

VEER NARMAD SOUTH GUJARAT UNIVERSITY

M.Sc. – PHARMACEUTICAL CHEMISTRY

SEMESTER-3

TO COME IN FORCE FROM JUNE-2008

PAPER- (I) MODERN ANALYTICAL TECHNIQUES-II

COURSE NO. - CPC- 301

Max. Marks: 70

Total Periods: 60

SECTION -1

UNIT-I : Ultraviolet Spectroscopy: Electromagnetic spectrum & its absorption by organic molecules, Electronic transitions & selection rules, Beer-Lambert law, Designation of UV bands, Instrumentation, UV absorption of organic compounds Carbonyl compounds, Unsaturated carbonyl compounds, dienes, Conjugated polymers, Applications.

UNIT-II : Infrared Spectroscopy: Introduction basic theory instrumentation, Combination, Overtones, Fermi resonance & mechanical coupling, Spectral features of major functional groups & factors affecting. Detailed study of vibrational frequency of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated). Interpretation of IR spectra of some representative compounds. Applications.

UNIT-III : Nuclear Magnetic Resonance Spectroscopy: Introduction, nuclear spin, energy absorption & relaxation. Basic ideas about instrument, chemical shift & factors affecting it, magnetic anisotropy, spin-spin coupling, coupling constant, Pople notation, first order & non first order splitting for two, three & four interacting nuclei., long range coupling, interpretation of PMR spectra of some representative compounds, simplification of spectra, shift reagents, NOE, FT NMR, Applications.

UNIT-IV : Mass Spectroscopy: Principal and theory, Instrumentation, different ionization techniques, (EI, CI, FAB, FD) General modes of fragmentation, fragmentation patterns of various classes of compound, Maclafferty rearrangement with representative compounds, Applications.

UNIT-V : Carbon- 13 NMR Spectroscopy: General considerations, chemical shift, aliphatic, olefinic, alkyne, aromatic, heteroaromatic & carbonyl carbon, coupling constants, 2 D NMR.

UNIT-VI : Problem based on above Spectroscopic techniques.

Reference Books:

1. Practical NMR Spectroscopy, M.L. Martin, J.J. Delpuch and G.J. Martin, Heyden.
2. Spectrometric identification of Organic compounds, R.M. Silverstein, G.C. Bassler and T.C. Morrill, John Wiley.
3. Introduction to NMR Spectroscopy, R.J. Abraham, J. Fisher and P. Loftus, Wiley.
4. Application of Spectroscopy of Organic compounds, J.R. Dyer, Prentice Hall.
5. Spectroscopy Methods in Organic Chemistry, D.H. Williams, I. Fleming, Tata McGraw-Hill.
6. Spectroscopy of Organic compounds, P.S. Kalsi, New Age International Ltd.

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TO COME IN FORCE FROM JUNE-2008
PAPER- (II) CHEMISTRY OF NATURAL PRODUCTS-I
COURSE NO. - CPC- 302

Max. Marks: 70

Total Periods: 60

SECTION -1

UNIT-I : VITAMINS: (10 Periods)

Introduction, Structure, Synthesis and biochemical functions of

- Vitamin A₁ and A₂
- Vitamins B₁ and B₂
- Biotins
- Vitamin E – Tocopherols
- Vitamin K group
- Biochemical importance of Vitamin B₁₂.

UNIT-II : ALKALOIDS: (10 Periods)

Introduction, Defination, Classification of Alkaloids:

Nature, Occurrence, Extraction, General properties, Test & physiological importance of following alkaloids:

- Phenylethylamine group: Adrenaline
- Pyrollidine-Pyridine group: Nicotine
- Quinoline group: Quinine
- Tropane alkaloids: Atropine, Cocaine
- Isoquinoline group: Papaverine
- Phenanthrene group: Morphine

Biosynthesis of alkaloids.

UNIT-III : PLANT PIGMENTS: (10 Periods)

Porphyryns: Structure, Spectral properties and Synthesis.

Haemoglobin, Chlorophyll and Bilirubin: General and structure determination (no synthesis)

Synthesis of cryptopyrrole, Phytopyrrole, Opsopyrrole and Haemopyrrole and their carboxylic acid derivatives.

SECTION -2

UNIT-IV : TERPENOIDS AND CAROTENOIDS: (10 Periods)

Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule.

Structure determination, stereochemistry, biosynthesis and synthesis of the following molecules:

Farnesol, Zingiberene, Cadinene, Santonin, Abietic acid, Squalene and Eudesmol.

UNIT-V : STEROIDS: (10 Periods)

Introduction, Sterols, Cholesterol and Ergosterol. Biosynthesis of sterols, Stereochemistry of steroids, Bile acids general and structure.

UNIT-VI : CARBOHYDRATES: (10 Periods)

Structural determination of starch and cellulose, their conformations
Carbohydrate metabolism - Kreb's cycle, glycolysis, glycogenesis and glycogenolysis, glyconeogenesis, pentose phosphate pathway.

REFERENCES:

1. Organic Chemistry, Vol. I & II (Sixth edition), I. L. Finar.
2. Chemistry of Organic Natural Products, Vol. I & II, O. P. Agrawal.
3. Organic Chemistry of Natural Products, Vol. I & II, Chatwal.
4. Chemistry of Vitamins – S. F. Dyke.
5. Chemistry of Heterocyclic compounds by Badger, Academic press.
6. Heterocyclic chemistry by R.C. Elderfield, Wiley, New York.
7. Natural Products by K.G. Bentley.
8. An Introduction to the Chemistry of Heterocyclic Compounds by R.M. Acherson, John Wiley, New York.

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PAPER- (III) INDUSTRIAL ORGANIC CHEMISTRY
COURSE NO. - CPC- 303

Max. Marks: 70

Total Periods: 60

SECTION -1

UNIT-I : UNIT PROCESSES IN ORGANIC CHEMISTRY: (10 Periods)

Halogenation, Hydroxylation, Amination and Alkylation Methods. and Industrial Chemicals derived from Benzene, Naphthalene and Anthracene using these processes.

UNIT-II : (A) NANO TECHNOLOGY: (10 Periods)

Introduction of nano materials and their size, the fundamental science behind nanotechnology.

(B) PHASE TRANSFER CATALYSIS IN GREEN SYNTHESIS

- Introduction
- Application of PTC in organic synthesis
- Oxidation using Hydrogen peroxide under PTC condition
- Crown ethers

(C) BIOCATALYSTS IN ORGANIC SYNTHESIS

- Introduction
- Biochemical Oxidation and Biochemical Reduction

Enzyme Catalyzed hydrolytic process

UNIT-III : DYES USED IN PHARMACEUTICAL CHEMISTRY (10 Periods)

- Biological Activity
- Adsorption and bactericidal effects
- Dyes used in diagnosis

SECTION -2

UNIT-IV : DISCONNECTION APPROACH (10 Periods)

- Synthons and synthetic equivalent disconnection approach, functional group.
- **One group C-C disconnections** –alcohols and carbonyl compounds, regioselectivity, alkene synthesis.
- **Two group C-C disconnections**- 1-3 di functionalized compounds, α,β -unsaturated carbonyl compound, 1-5 di functionalized compounds,
- **Aromatic Heterocycles with two heteroatoms** : Pyrimidine, pyrazine, pyridazine

UNIT-V : INDUSTRIALLY IMPORTANT REAGENTS**(10 Periods)**

- Baker yeast
- D.D.Q.
- Dicyclohexyl carbodimide
- 1,3-Dithiane
- Lithium dimethyl cuprate
- Osmium tetroxide
- Selenium dioxide
- Trimethyl silyliodide
- Wilkinson's catalysts
- Crown ethers and Merrifield resin.

UNIT-VI : POLLUTION TESTING AND EFFLUENT TREATMENT:**(10 Periods)**

- Principle Chemical reactions & Method of analysis of important air pollutants, water & waste water analysis in a different parameters (DO, BOD and COD), Biological role of toxic elements.
- Water pollution treatment: Principle and current practices, Primary, Secondary and Tertiary treatments plan of Pharmaceutical industry.
- Environment laws, Statutory requirements, environmental impact assessment study.

General References:

- (1) Unit process in Organic Synthesis by P. M. Groggins.
- (2) Chemical Process Industries by R. N. Shreve.
- (3) Riegel's Hand-Book of Industrial Chemistry, Ed. by James A. Kent.
- (4) Industrial Chemicals by Faith, Keyes, Clark.
- (5) Chemicals from petroleum by Weddams.
- (6) Nanotechnology, M. Ratner and D. Ratner, Pearson.