

**PAPER-III (B)**  
**MODERN ASPECTS OF ORGANIC**  
**CHEMISTRY**

**Time: 3 Hrs.**

**M.M. 100**

**Note: The paper will be divided into THREE sections.**

**Section-A :** Ten questions (short type answer) two from each Unit will be asked. Each question will be of one mark and the candidates are required to attempt all questions.

**Total 10 marks**

**Section-B :** Five questions (answer not exceeding 250 words) one from each Unit with internal choice will be asked and the candidates are required to attempt all questions. Each question will be of 10 marks

**Total 50 marks**

**Section-C :** Four questions may be in parts covering all the five Units (answer not exceeding 500 words) will be asked. The candidates are required to attempt any TWO questions. Each question will be of 20 marks.

**Total 40 marks**

**UNIT-I**

**Reagents containing phosphorus, silicon and boron** – preparation, properties and applications of following in organic synthesis and mechanistic details.

**Selective organic name reactions** – Hoffmann-Loffer-Fretag reaction, chichibabin reaction, Sharpless, asymmetric epoxidation, Barton reaction, ene reactions, Stork enamine reaction.

**UNIT-II**

**Oxidation** – Introduction, different oxidative processes, hydrocarbons (alkenes, aromatic rings, activated and inactivated saturated C - H groups), alcohols, diols, aldehydes, ketones, ketals and carboxylic acids, singlet oxygen, ruthenium tetroxide and Tl (III) nitrate as oxidizing agent, Probst reaction, Wacker's process, Barbier-Wieland degradation

**Reduction** – Introduction, different reductive processes, hydrocarbons (cyclo alkanes, alkenes, conjugated system, alkynes and aromatic rings), carbonyl compounds, nitro, azo and oxime compounds, hydrogenolysis, reductions using Wilkinson's catalyst, Meerwein -Ponndorf - Verley reduction.

**UNIT-III**

**Rearrangements** - General mechanistic considerations-nature of migration, migratory aptitude, memory effects.

A detailed study of the following rearrangements - Pinacol-Pinacolone, Wagner-Meerwin, Demjanov, Benzil - Benzilic acid, Favorskii, Arndt-Eistert synthesis, Neber, Backmann, Hofmann, Curtius, Schmidt, Benzidine, Bayer-Villiger and Shapiro reaction.

**UNIT-IV**

**Disconnection approach** – An introduction to synthons, synthetic equivalents, functional group

interconversions, elementary idea of disconnection in Diels-Alder reaction, 1,3 - and 1,5- difunctionalised compounds,  $\alpha$ ,  $\beta$  - unsaturated carbonyl compounds, Michael reaction, Robinson annelation.

**Protecting group** - Principle of protection of hydroxy, amine and carbonyl groups.

### UNIT-V

**Bonds weaker than covalent** - Addition compounds, crown ether complex and cryptands, inclusion compounds, cyclodextrins, catenanes and rotaxanes.

**Applications of the following in the organic synthesis** - Phase transfer catalysts, polymer supported reagents, biocatalysts, microwave and ultrasound induced reactions.

### Chemistry of fullerenes

#### Books Recommended :

1. Modern Synthetic Reactions, H.O. House, W.A Benjamin
2. Some Modern Methods of Organic Synthesis, W. Carruthers, Cambridge Univ. Press.
3. Principles of Organic Synthesis, R.O.C Norman and J.M. Coxon, Blackie Academic & Professional
4. Advanced Organic Chemistry, F.A Carey and R.J. Sundberg.

5. Rood's Chemistry of Carbon Compounds, S. Coffey.
6. Organic Synthesis-Concept, Methods and Starting Materials, J. Fuhrhop and G. Penzillin.
7. Guide Book to Organic Synthesis, R.K. Mackie & D.M. Smith, ELBS.
8. Organic Synthesis, V.K. Ahuwalla and Renu Agarwal, Narosa
9. Synthesis, Approaches in Organic Chemistry, R.K. Bansal, Narosa
10. Advanced Organic Chemistry -Reactions, Mechanism and Structure, Jerry March, John Wiley.
11. Designing Organic Synthesis, S.Warren, Wiley.