

## BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY-I (Theory)

45 Hours

### Course Content:

General methods of preparation and reactions of compounds superscripted with asterisk (\*) to be explained. To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences.

#### Unit-I

07 Hours

**Classification, Nomenclature and Isomerism:** Classification of Organic Compounds, Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds). Structural isomerism in organic compounds.

#### Unit II

10 Hours

##### Alkanes\*, Alkenes\* and Conjugated dienes\*

$sp^3$  hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes,  $sp^2$  hybridization in alkenes.

$E_1$  and  $E_2$  reactions – Kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeff's orientation and evidences.  $E_1$  versus  $E_2$  reactions, Factors affecting  $E_1$  and  $E_2$  reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti-Markownikoff's orientation.

Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement.

#### Unit III

10 Hours

##### Alkyl halides\*

$SN_1$  and  $SN_2$  reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.  $SN_1$  versus  $SN_2$  reactions, Factors affecting  $SN_1$  and  $SN_2$  reactions.

Structure and uses of ethyl chloride, chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

**Alcohols\***- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol.

**Unit-IV****10 Hours****Carbonyl compounds\* (Aldehydes and ketones)**

Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanillin, Cinnamaldehyde.

**Unit-V****08 Hours**

**Carboxylic acids\*:** Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester.

Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid.

**Aliphatic amines\*:** Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine.

## BP208P. PHARMACEUTICAL ORGANIC CHEMISTRY-I (Practical)

4 Hours / week

- A. Systematic qualitative analysis of unknown organic compounds like
1. Preliminary test: Color, odor, aliphatic/aromatic compounds, saturation and unsaturation, etc.
  2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test.
  3. Solubility test.
  4. Functional group test like Phenols, Amides/Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides.
  5. Melting point/Boiling point of organic compounds.
  6. Identification of the unknown compound from the literature using melting point/boiling point.
  7. Preparation of the derivatives and confirmation of the unknown compound by melting point/boiling point.
  8. Minimum 5 unknown organic compounds to be analyzed systematically.
- B. Preparation of suitable solid derivatives from organic compounds.
- C. Construction of molecular models.

### Recommended Books (Latest Editions)

- Organic Chemistry by Morrison R.T., Boyd R.N. and Bhattacharjee, S.K., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.), New Delhi.
- Organic Chemistry by I.L. Finar, Volume-I, Pearson Education Ltd, New Delhi.
- Organic Chemistry by Bruice P.Y. and Prasad, K.J.R., Dorling Kindersley (India) Pvt. Ltd, New Delhi.
- A Guidebook to Mechanism in Organic Chemistry by Peter Sykes, Longman Group Ltd., Noida.
- Strategic Applications of Named Reactions in Organic Chemistry by Laszlo Kurti and Barbara Czako, Elsevier Academic Press.
- Reaction and Reaction Mechanism by Ahluwalia/Chatwal, Narosa Publishing House, New Delhi.
- Organic Chemistry by Jain M.K., Sohan Lal Nagin Chand & Co, New Delhi.
- Elementary Practical Organic Chemistry by Vogel A.I., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.), New Delhi.
- Practical Organic Chemistry by Mann F.G, and Saunders, B.C., Dorling Kindersley (India) Pvt. Ltd. (Pearson Education Ltd.), New Delhi.
- Advanced Practical Organic Chemistry by N.K. Vishnoi, Vikas Publishing House Pvt. Ltd., Noida.
- Introduction to Organic Laboratory Techniques by Pavia, Lampman and Kriz, Cengage Learning, Delhi.