9. **CARBONIUM ION REARRANGEMENTS:**
   Pinacol-Pinacolone, Wagner-Meerwein, Wolff, Hofmann and Beckmann rearrangements.

10. **CARBANIONS REARRANGEMENTS:**
    Condensation reaction (Aldol condensation, Favorskii rearrangement, Wittig rearrangement).

PHARMACEUTICAL CHEMISTRY-I (ORGANIC) (Practical)

Paper 7 **Marks 100**

NOTE: Practicals of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the facilities, e.g.

1. Organic analysis: Identification of unknown simple organic compounds.
2. Organic Preparations: Benzoic acid, Aspirin, Acetanilide, Iodoform, Nitrophenol, 3-nitrophthalic acid, Benzhydrol and 2, 4-Dinitrochlorobenzene.

PHARMACEUTICAL CHEMISTRY-II (BIOCHEMISTRY) (Theory)

Paper 2 **Marks 100**

1. **GENERAL INTRODUCTION AND BASIC BIOCHEMICAL PRINCIPLES:**
   Role of pharmaceutical biochemistry in the health profession. Nature of biochemical reactions.

2. **BASIC CHEMISTRY OF BIOMOLECULES (Nature, Classification etc.):**
   a) Carbohydrates: Chemistry, Classification, Reactions of Carbohydrates, Optical activity, Biological and pharmaceutical importance of carbohydrates.
   b) Lipids: Chemistry of Fatty acids and Lipids, Classification (Saponifiable and non-saponifiable lipids, Simple, Complex and Derived lipids), Reactions of Fatty acids and other Lipids, Essential fatty acids, Biological and pharmaceutical importance of lipids.
   c) Proteins and Amino acids: Chemistry, Classification of proteins and amino acids, Reactions of proteins and amino acids, Organizational levels, Macromolecular nature of proteins, Biological and pharmaceutical importance of proteins and amino acids.
   d) Nucleic acids: Chemistry, Types (DNA, RNA, mRNA, tRNA, rRNA), Purine and Pyrimidine bases, Nucelosides, Nucelotides, Structures of nucleic acids, Biological and pharmaceutical importance of nucleic acids.
   e) Vitamins: Chemistry, Classification (Fat-soluble and water-soluble vitamins), Biological and pharmaceutical importance of vitamins.
   f) Hormones: Chemistry, Classification (Proteinous and nonproteinous hormones, amino acid derivatives, steroids), Biological and pharmaceutical importance of hormones.
   g) Enzymes: Chemistry, Classification, Mode of action, Kinetics (Michaelis Menten Equation and some modifications), Inhibition, Activation, Specificity, Allosteric enzymes, Factors affecting the rate of an enzyme-catalyzed reaction, Biological and pharmaceutical importance, Mechanism of action of some important enzymes (Chymotrypsin, Ribonuclease).

3. **METABOLIC FATE OF BIOMOLECULES (Anabolism and Catabolism):**
   a) Carbohydrates: Brief introduction to the digestion and absorption of carbohydrates, Aerobic and anaerobic breakdown of Glucose, Glycolysis, Pentose Phosphate Pathway, Glycogenolysis, Glycogenesis, Gluconeogenesis, Citric acid cycle, Energetics of various metabolic processes.
   b) Lipids: Brief introduction to the digestion and absorption of lipids, Oxidation of fatty acids through β-oxidation, Biosynthesis of fatty acids, neutral lipids and cholesterol.
   c) Proteins and Amino acids: Brief introduction to the digestion and absorption of proteins and amino acids, Metabolism of essential and non-essential amino acids, Biosynthesis and catabolism of Haemins and porphyrin compounds.
   d) Bioenergetics: Principles of bioenergetics. Electron transport chain and oxidative phosphorylation.

4. **REGULATION OF METABOLIC PROCESSES:**
   a. Role of Vitamins: Physiological role of Fat-soluble (A, D, E and K) and Water-soluble (Thiamin, Riboflavin, Pantothenic acid, Niacin, Pyridoxal phosphate, Biotin, Folic acid, Cyanocobalamin- members of B-complex family and Ascorbic acid), Coenzymes and their role in the regulation of metabolic processes.
   b. Receptor mediated regulation (Hormones): Mechanism of action of hormones, Physiological roles of various hormones, Site of synthesis and target sites of hormones.
   c. Secondary Messengers: Role of cAMP, Calcium ions and phosphoinositol in the regulation of metabolic processes.
   d. Gene Expression: Replication, Transcription and Translation (Gene expression) Introduction to Biotechnology and Genetic Engineering, Basic principles of Recombinant DNA technology, Pharmaceutical applications, Balance of Catabolic, Anabolic and Amphibolic processes in human metabolism, Acid-Base and Electrolyte Balance in Human body.

5. **INTRODUCTION TO CLINICAL CHEMISTRY:** Introduction and Importance of the clinical chemistry. Laboratory tests in diagnosis of diseases including Uric acid, Cholesterol, Billirubin and Creatinine.

PHARMACEUTICAL CHEMISTRY-II (BIOCHEMISTRY) (Practical)

Paper 8 **Marks 100**

Qualitative analysis of: Carbohydrates, Amino acids, Peptides and Sugar, Uric acid, Proteins, Lipids and Sterols (Cholesterol), Bile salts, Billirubin, Analysis of Cholesterol and Creatinine in Blood.

Quantitative analysis of: Carbohydrates-Glucose (reducing sugar) and any other carbohydrate using Benedict and Anthrone method, Amino acids, Peptides and Proteins using Biuret and Ninhydrin (Spectrophotometric) method. Analysis of normal and abnormal components of Urine- Sugar, Uric acid, Billirubin, Cholesterol and Creatinine.