The subject is to be treated in the light of modern perspective giving stress wherever possible on the following aspects: structure, nomenclature, preparation, properties, energy of activation, transition state, resonance, stereochemistry, optical isomerism, Geometric isomerism and mechanism of reaction.

I. Stereochemistry: 14 hours; 17-18 marks
a) Stereo isomerism, classification of stereoisomers tetrahedral optical activity, enantiomerism, diastereoisomerism, meso structures, elements of symmetry, chirality, chiral centers, configuration, specification of D and L configuration, R and S configuration. Recemic modification and resolution of recemic mixture, conformational isomers, asymmetric synthesis, Reaction of chiral molecules
b) Stereo selective and stereospecific reactions with examples. 2 hours; 3-4 marks

c) Geometrical isomerism, its nature of formation, rotation about bonds: nomenclature of isomers, determination of configuration, Nature of E and Z forms 5 hours; 6-7 marks
d) Stereochemistry of alicylic compounds, allenes and biphenyls, stereochemistry of oximes

II. Heterocyclic Chemistry: 27 hours; 34-36 marks
General classification of heterocyclic compounds, nature and nomenclature, reactions, synthesis and properties of the following heterocyclic systems and their derivatives.

a) Pyrrole, Furan and Thiophene
b) Indole, Benzofuran and Benzothiophene
c) Pyridine
d) Quinoline, Isoquinoline, acridine
e) Pyrazole, Imidazole, Oxazole, Isoxazole and Thiazole
f) Pyrimidine, Pyrazine, Pyridazine, Purine, benzodiazepine and phenothiazine

III Chemistry of bio molecules of pharmaceutical importance:
1. Carbohydrates: 9 hours; 11-12 marks

2. Fats and Oils: 4 hours; 5-6 marks
Chemistry of fats oils and waxes. Occurrence and composition. Hydrolysis of fats, Fats as sources of pure acids and alcohols. Analytical constants of fats and oils such as Saponification value, Iodine value, Acid value and Unsaponifiable matter and methods of their determination and significance. Rancidity of oils, hardening of oils, hydrogenation of oils, drying, semidrying and nondrying oils with example.

3. Proteins and Amino acids: 4 hours; 5-6 marks
Introduction, definition, classification of proteins and amino acids their properties Zwitterions. Isoelectric point and its significance. reactions, synthesis of amino acids (Gabriel's Pthalimide synthesis, Strecker's synthesis, Koop's and Erlenmeyer's azalactone
synthesis) and reactions. Peptide linkages, Peptide synthesis, solid phase synthesis structures of proteins, C-terminal and N-terminal analysis.

4. **Protection and De-protection of groups:** 3 hours; 4-5 marks
   Introduction to protection and deprotection of functional groups examples of two protective agents each for amino, hydroxyl and carbonyl groups with their significance in organic synthesis.

5. **A study and specific uses of the reagents in organic synthesis including their mechanism** 4 hours; 5-6 marks
   a) Aluminium isopropoxide – Meerwein – Ponndorf- Verley reduction, Oppenauer oxidation.
   b) Aluminium tertiary butoxide – Allylic bromination
   c) Lithium aluminium hydride – Reduction of carboxylic acid
   d) Periodic acid – Oxidation of 1,2 – diol to carbonyl compound
   e) Sodamide – Chichibian reaction
   f) Sodium borohydride – Reduction of aldehyde carbonyl group
   g) Metachloro peroxybenzoic acid – Beyer – villegier oxidation (oxidation of ketone to esters)
   h) Diazo methane – Buchaner – Curtius – Schlotterbeck reaction (Aldehydes to methyl ketones)
I. Quantitative determination of organic compounds via functional groups **
1. Phenolic group by bromination method
2. Alcoholic group by acetylation method
3. Carbonyl group by hydroxylamine hydrochloride-pyridine method
4. Aldehyde group by sodium sulphite-sulphuric acid procedure
5. Carboxyl group by acid-base method
6. Determination of acetone by sodium hypoiodide method
7. Amino group by bromination method
8. Amino acid Formal titration method

II. Analysis of oils and fats: (I.P. Method)*
1. Acid value
2. Saponification value
3. Iodine value

III. Synthesis/ preparation involving more than one step*
1. p-bromoaniline from acetonilide
2. p-Nitroaniline from acetanilide
3. p-Nitrophenyldrazine from p-nitroaniline
4. 3-methyl-1-phenyl-5-pyrazole from ethyl acetoacetate
5. Benzilic acid from benzoin
6. Pthalimide from benzophenone
7. Pthalimide from pthalic acid
8. Synthesis of 2, 3-Diphenyl quinoxaline
9. Benzimidazole Orthophenylene Diamine

Note: ** Denotes major experiments           * Denotes minor experiments

SCHEME OF EXAMINATION

<table>
<thead>
<tr>
<th></th>
<th>Marks</th>
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<tbody>
<tr>
<td>1 Synopsis</td>
<td>10</td>
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<tr>
<td>2 Major Experiment (**)</td>
<td>30</td>
</tr>
<tr>
<td>3 Minor Experiment (*or oil analysis)</td>
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<tr>
<td>4 Viva</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>70</strong></td>
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</table>
PHARMACEUTICAL ORGANIC CHEMISTRY-II TEXT BOOKS (THEORY)

PHARMACEUTICAL ORGANIC CHEMISTRY-II REFERENCE BOOKS (Theory)
8. Chemistry and Natural Products by Chatwal Vol. 1 & 2
9. Reaction and reagents O P Agrawal, Goel Publishing House, Subhash Bazar, Meerut (U.P) India

PHARMACEUTICAL ORGANIC CHEMISTRY-II REFERENCE BOOKS (Practical)
2. Mann and Sounders, Practical Organic Chemistry-ELBS and Longman group Ltd.,
### LIST OF MINIMUM EQUIPMENTS REQUIRED

<table>
<thead>
<tr>
<th>No.</th>
<th>Equipment</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>1.</td>
<td>Suction Pump</td>
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</tr>
<tr>
<td>2.</td>
<td>Analytical Balance</td>
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<tr>
<td>3.</td>
<td>Physical Balance</td>
<td>05</td>
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<tr>
<td>4.</td>
<td>Triple Beam Balance</td>
<td>Adequate</td>
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<tr>
<td>5.</td>
<td>Water Baths, Reflux flask and condenser</td>
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<tr>
<td>6.</td>
<td>Hot Plate</td>
<td>Adequate</td>
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<tr>
<td>7.</td>
<td>Mechanical Stirrer</td>
<td>Adequate</td>
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<td>8.</td>
<td>Magnetic Stirrers with Thermostat</td>
<td>Adequate</td>
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<tr>
<td>9.</td>
<td>Distillation Unit</td>
<td>01</td>
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<tr>
<td>10.</td>
<td>Refrigerator</td>
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<tr>
<td>11.</td>
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