Elective Paper II (Group B)
Heterocyclic Chemistry **60 Hrs.**

I Nomenclature of Heterocycles **4 hrs**

Replacement and systematic nomenclature (Hantzsch Widman system) for monocyclic, fused and bridged heterocycles.

II Aromatic Heterocycles **5 hrs**

General chemical behaviour of aromatic heterocycles, classification (structural type), criteria of aromaticity (bond length, ring current and chemical shifts in ^{1}H NMR-spectra, empirical resonance energy, delocalization energy and Dewar resonance energy, diamagnetic susceptibility exaltation). Heteroaromatic reactivity and tautomerism in aromatic heterocycles.

III Non Aromatic Heterocycles **6 hrs.**

Strain bond angle and torsional strains and their consequences in small ring heterocycles. Conformation of six membered heterocycles with reference to molecular geometry, barrier to ring inversion, pyramidal inversion and 1,3 diaxial interaction. Stereo-electronic effects – anomeric and related effects. Attractive interactions – hydrogen bonding and intermolecular nucleophilic – electrophilic interactions.

IV Heterocyclic Synthesis **4 hrs.**

Principles of heterocyclic synthesis involving cyclization reactions and cycloaddition reactions.

V Small Ring Heterocycles **5 hrs.**

Three membered and four membered heterocycles- synthesis and reactions of aziridines, oxiranes, thiiranes, azetidines, oxetanes and thietanes.

VI Benzo-Fused Five-Membered Heterocycles **5 hrs.**

Synthesis and reactions including medicinal applications of benzopyrroles, benzofurans, and benzothiophenes.

VII Meso-Ionic Heterocycles **5 hrs.**

General classification, chemistry, chemistry of some important meso-ionic heterocycles of type-A and B and their applications.

VIII Six-Membered Heterocycles with One Heteroatom **6 hrs.**

Synthesis and reactions of pyrylium salts and pyrones and their comparison with pyridinium & thiopyrylium salts and pyridones. Synthesis & reactions of quinolizinium and benzopyrelium sals, coumarins and chromones.

IX Six-Membered Heterocycles with Two or more Heteroatoms **5 hrs**

Synthesis and reactions of diazines, triazines, tetrazines and thiazines.

X Seven and Large Membered Heterocycles **5 hrs**

Synthesis and reactions of azepines, oxepines, thiepines, diazepines, thiazepines, diazocines, dioxocines and dithiocines.

XI Heterocyclic Systems Containing P, As, Sb and B **10 hrs**

Heterocyclic rings containing phosphorous: introduction, nomenclature, synthesis and characteristics of 5- and 6-membered ring systems- phosphorinanes, phosphorines, phospholanes and phospholes. Heterocyclic rings containing As and Sb: introduction, synthesis and characteristics of 5- and 6-membered ring systems. Heterocyclic rings containing B: : introduction, synthesis, reactivity and spectral characteristics of 3-,5- and 6-membered ring systems.

Books Suggested:

1. Heterocyclic Chemistry Vol. 1-3, R. R. Gupta, M. Kumar and V. Gupta, Springer Verlag
2. The Chemistry of Heterocycles, T. Eicher and S. Hauptmann, Thieme.
3. Heterocyclic Chemistry, J. A. Joule, K. Mills and G. F. Smith, Chapman and Hall.
4. Heterocyclic Chemistry, T. L Gilchrist, LongmanScientific Technical.
5. Contemporary Heterocyclic Chemistry, G. R. Newkome and W. W. Paudler, Wiley-Inter Science.
6. An Introduction to the Heterocyclic Compounds, R. M. Acheson, John Wiley.
7. Comprehensive Heterocyclic Chemistry, A.R.Katritzky and C.W.Rees, eds. Pergamon Press.