I Ultraviolet Spectroscopy

1. Functional groups
2. Electromagnetic radiations & spectrum
3. Transitions or Excitation
4. Defination of Spectroscopy
5. Absorption and Emission Spectrum
6. Range of UV and Visible radiation
7. Principle of Electronic Spectroscopy
8. Presentation of UV Spectra
9. Types of Electronic Transitions
10. Selection Rules - Orbital and Spin Selection rule
11. Band nature of Spectrum
12. Factors affecting intensity of spectral lines
13. Selection of solvent
14. Instrumentation - UV Visible Spectrophotometer
15. Chromophore and Auxochrome
16. Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shift

17. Effect of polarity of solvent on different transitions

18. F.C. Principle

19. Isobestic point

20. Applications of UV-Visible Spectroscopy - Distinguish Geometrical isomers, Keto-enol tautomers, Quantitative analysis, impurities estimation, functional group identification.

21. Beer Lambert Law, Numericals

22. Woodward - Fieser Rule for conjugated dienes, Calculation of λ max

23. Woodward - Fieser Rule for α, β-unsaturated carbonyl compounds, Calculation of λ max

24. Case study - Benzene, Aniline, Chlorobenzene, Toluene, Anilinium ion

II I.R. Spectroscopy

1. Range of infrared radiation
2. Principle of IR Spectroscopy
3. Presentation of spectra
4. Types of Fundamental vibrations - Stretching and Banding
5. Calculation of modes of vibrations for linear and non-linear molecules
6. Selection Rules - IR active and inactive
7. Hooke's Law, Numericals
8. Factors affecting wave number or Stretching frequency
9. Impact of H-bonding - Inter and Intra molecular H-bonding
10. Influence of Inductive effect (-I & +I)
11. Role of Resonance
12. Functional group and fingerprint region
13. Non-fundamental bands - Combination, Difference and Overtone, Zero point energy

14. Applications of IR Spectroscopy - Identification of unknown functional gp, Geometrical isomers, Keto-enol tautomers, Impurities, Types of H-bonding, Kinetics of reaction

15. Case study of organic compounds - HCHO, CH_3CHO, CH_3COCH_3, $ClCH_2COCH_3$, $ClCH_2COCH_2Cl$, C_6H_5CHO, $C_6H_5COCH_3$, $C_6H_5COC_6H_5$