AE-760

M. Sc. (Final)
Term End Examination, 2016-17

CHEMISTRY

Paper - I

Application of Spectroscopy, Photochemistry and Solid State Chemistry

Time : Three Hours] [*Maximum Marks* : 100
[*Minimum Pass Marks* : 36

Note : Answer any **five** questions. The figures in the right-hand margin indicate marks.

1. (*a*) Explain the characteristic vibrational frequencies of alkanes, alkenes and alkynes. 10

(*b*) How will you differentiate between different types of hydrogen bonding by IR spectroscopy ? 6

(*c*) How is the presence of anhydride group identified by IR spectroscopy ? 4

2. (*a*) Explain methods of the simplification of complex NMR spectra. 10

(*b*) Explain COSY, NOESY, APT and DEPT techniques. 10

3. (*a*) Discuss the applications of resonance Raman Spectroscopy. 6

(*b*) Explain the following : 14

(*i*) Hyperfine coupling

(*ii*) Significance of g-tensors

4. (*a*) Explain the principle and instrumention of mass spectroscopy. 10

(*b*) Explain the factors affecting fragmentation. 5

(*c*) What are metastable peaks ? 5

5. (*a*) How can you calculate λ_{max} value of conjugated dienes and conjugated carbonyl compounds by Fieser-Woodward rule ? 8

(*b*) Explain the various electronic transitions which take place between 185-800 nm. 8

(*c*) Explain Beer-Lambert law. 4

6. (*a*) Write note on circular dichroism and its applications. 8

(*b*) Explain following : 12

(*i*) Nuclear magnetic double resonance

(*ii*) Fourier transform technique

7. (*a*) Discuss types of photochemical reaction. Derive equation for rate constant of any one photochemical reaction. 8

(*b*) Explain following photochemical reactions of aromatic compounds : 12

(*i*) Isomerisation

(*ii*) Addition reaction

(*iii*) Substitution reaction

8. (*a*) Explain following photochemical reactions of carbonyl compounds : 12

(*i*) Norrish type I reaction

(*ii*) Norrish type II reaction

(*iii*) Oxetane formation

(*b*) Discuss the photochemistry of vision and formation of photochemical smog. 8

9. (*a*) How will you differentiate among metal, insulators and somiconductors ? 4

(*b*) Explain p-n junction. 10

(*c*) Write a note on point defects. 6

10. Explain the following : 20

(*a*) Optical properties of solids

(*b*) Organic charge transfer complex

(*c*) Thermodynamics of Frankel defect

(*d*) Colour centers

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