LJ-454

M.Sc. Chemistry

3rd Semester Examination, July-Dec., 2020

Resonance Spectroscopy, Photochemistry

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer **all** questions. All parts of a question should be answered at one place. Be precise and to the point in your answers. The figures in the right-hand margin indicate marks.

Unit-I

1. (*a*) Explain hyperline coupling. 6

(*b*) Describe the principle of ESR Spectroscopy. What are the applications of ESR ? 8

(*c*) Discuss the application of NQR Spectroscopy. 6

OR

(*a*) Explain g-tensors. 6

(*b*) Describe the basic theory of NQR spectroscopy. 8

(*c*) What is nuclear quadrupole ? 6

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Unit-II

2. (*a*) How are photoelectron spectra interpreted in terms of Koopman's theorem ? 6

(*b*) Write a note on chemical shift in ESCA. 8

(*c*) Explain one method for determination of dipole moment. 6

OR

(*a*) Write note on photoelectron spectra of single atom. 6

(*b*) Discuss the chemical and surface application of photocoustic spectroscopy. 8

(*c*) Describe Auger electron spectroscopy. 6

Unit-III

3. (*a*) Discuss the interaction of electromagnetic radiation with matter. 6

(*b*) Explain the effect of light intensity on the rate of photochemical reactions. 8

(*c*) Write a note on Stern-Volmer equation. 6

OR

(*a*) Discuss the photochemistry of vision. 6

(*b*) Define Actinometry. How is physical and chemical actinometry useful for the determination of quantum yield. 8

(*c*) Write a note on Jablonski equation. 6

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Unit-IV

4. (*a*) Which electronic transition is feasible in carbonyl compounds ? Discuss Norrish Type-I and Norrish Type-II process of photochemical cleavage of carbonyl compounds. 10

(*b*) Discuss the photochemical rearrangement reaction in 1, 4 and 1, 5 dienes. 10

OR

(*a*) Discuss the photochemical geometric isomerisation in alkenes with special reference to direct irradiation and using photosensitizer. 10

(*b*) The reaction of the ketone^3 ($n \rightarrow \pi^*$) to alkenes gives cyclic product (oxytone). Discuss the mechanism of oxytone formation. 10

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