



I Semester M.Sc. Degree Examination, January 2015
(CBCS)
CHEMISTRY
C – 105 : Photochemistry (Soft Core)

Time : 3 Hours

Max. Marks : 70

Instruction : Answer question No. 1 and any five of the remaining questions.

1. Answer any ten of the following : (10×2=20)

- State Stark-Einstein's law of photochemical equivalence.
 - List the term symbols for $L = 4$ and $S^1 = 1$.
 - The bond energy in a molecule is 142.95 k cal/mole. What is the wave length of light capable of dissociating this molecule ?
 - State and explain non-crossing rule.
 - Differentiate between spontaneous emission and stimulated emission.
 - What is the difference between singlet and triplet states ?
 - Explain the terms "inter-system crossing" and "intra-system crossing".
 - Describe the mechanism of conductivity in semiconductors.
 - Distinguish between photo-dissociation and pre-dissociation.
 - What are photovoltaic cells ? Give an example.
 - TiO_2 is a good photo-catalyst. Give reasons.
 - What is p-n junction solar cell ?
2. a) A radiation of 253 nm incident on HI results in the decomposition of 1.85×10^{-2} moles per 1000 cal of radiant energy. Calculate the quantum efficiency.
- Illustrate spin-orbit coupling of oxygen.
 - Write an explanatory note on Laporte's selection rules. (4+3+3=10)



3. a) Discuss the changes in dipole moment and redox potentials of electronically excited molecules.
- b) Write brief notes on
- i) Frank Condon principle and
 - ii) Potential energy diagram of excited species. **(4+6=10)**
4. a) Describe the theory and applications of phosphorescence.
- b) Explain the laser beam experiment for the study of electronically excited states.
- c) Discuss the effect of solvent-solvent interaction on the electronic spectra. **(3+3+4=10)**
5. a) Give an account on classification of photochemical reactions.
- b) With a suitable example discuss the kinetics of photo-fragmentation reaction. **(4+6=10)**
6. a) What is photosensitizer ? Explain the various mechanisms involved in mercury photosensitized reactions.
- b) Discuss the bonding and conductivity of semiconductors.
- c) Write a brief note on Schottky barrier solar cells. **(4+3+3=10)**
7. a) Discuss the application of TiO_2 in the photo-degradation of industrial effluents.
- b) Write brief notes on
- i) atmospheric photochemistry and
 - ii) impurity semiconductors. **(4+6=10)**
8. a) Discuss the rules for transition between the two energy states.
- b) Explain the photo-splitting of water using colloidal suspension.
- c) With suitable examples discuss the importance of photochemistry. **(3+3+4=10)**
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