



III Semester M.Sc. Degree Examination, December 2014
(2010-2011 Scheme)
(NS)
CHEMISTRY
C-302-PC : Photochemistry

Time : 3 Hours

Max. Marks : 80

Instruction : Answer question number 1 and **any five** of the following.

1. Answer **ten** questions of the following. **(2×10=20)**
- a) Calculate the intensity of the light whose power is $2 \times 10^{-3} \text{W}$ and wavelength is 632.8 nm.
 - b) Convert the energy 598 kJmol^{-1} of the substance into electron volts.
 - c) Draw the potential energy diagram for a diatomic molecule representing both ground and excited state with the vibrational energy levels depicting the distribution functions.
 - d) Differentiate between photo dissociation, pre-dissociation and induced pre-dissociation by using potential energy curves.
 - e) Explain the terms 'blue shift' and 'red shift' with relevant expressions.
 - f) Write the equation pertaining to the numerical value of the integrated intensity of absorption and define the terms.
 - g) Define the term oscillator strength.
 - h) Write the electronic configuration of oxygen molecule.
 - i) State the non-crossing rule of teller.
 - j) Depict the electronic configuration, state diagram using suitable example.
 - k) How did Kasha classify the organic molecules ?
 - l) What are Lasers ? Explain the process with suitable energy level diagram.
2. a) Draw the energy level diagram for a Inorganic Octahedral metal complex.
- b) Describe the Nodal properties and energy levels of benzene. **(6+6)**

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3. a) Compare thermal cyclization and photochemical cyclization process on the basis of correlation rules.
- b) Give the configuration of π - electron in the cation, free radical and anion for allyl system with the help of energy level diagram. **(6+6)**
4. a) Show that integrated absorption intensity is directly proportional to the square of the modulus of the transition moment integral.
- b) Describe the Einstein treatment of absorption and emission. **(6+6)**
5. a) How do you obtain the excited ? State dipole moment based on Onsager's theory and Franck Condon principle ?
- b) A 4 mm thick glass sheet transmits 20% of the incident light of wavelength 300 nm. What percentage of light of same wavelength will be absorbed by 2 mm thick glass sheet ? **(8+4)**
6. a) Derive the term symbols for the interaction between two p-electrons of O atom and draw the energy level diagram for the electronic configuration of $(np)^2$ illustrating spin-orbit coupling and Hund's rule.
- b) Describe the process of quenching and collisional deactivation with Stern-Volmer plot by taking suitable example. **(8+4)**
7. a) Give the direct product rule for assigning molecular symmetry from orbital symmetry.
- b) Draw the potential energy diagram for molecular oxygen electronic energy states and depict the various absorption bands.
- c) Give the various possible reaction path ways taken up by the excited state molecule. **(4+4+4)**
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