

**Total Pages : 8**

**H-6345**

**M.Sc. (Semester-IV) Examination, 2022**

**CHEMISTRY**

**( Photo Inorganic Chemistry)**

***Time Allowed : Three Hours***

***Maximum Marks : 70***

***Minimum Passing Marks : 25***

**Note:** This question paper is divided into four sections. Attempt questions from all four sections as per given directions. Distribution of marks is given in each section.

**SECTION-A**

**( Objective Type Questions )**

**Note :** Attempt **any ten** questions. Each question carries **1** mark. [1x10=10]

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**( 1 )**

**[P.T.O.]**

1. (A) Fill in the blanks :
- (i) \_\_\_\_\_ is concerned with chemical effects of light.
  - (ii) The quantum yield for reaction  $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$  is \_\_\_\_\_.
  - (iii) The reaction which are caused by heat and in absence of light is called \_\_\_\_\_.
  - (iv) Anabaena, a  $\text{N}_2$  fixer is present in the root pockets of \_\_\_\_\_.
  - (v) The migration of electron is from ligand to the metal, then the charge transfer is called \_\_\_\_\_.
- (B) Choose the correct option of the following :
- (vi) The energy contained in one Einstein is :
    - (a)  $E = h\nu$
    - (b)  $Nhc / \lambda$
    - (c)  $Nh\nu / c$
    - (d)  $Nhc / \nu$

(vii) Formation of organic nitrogen compound like amino acids from inorganic nitrogen compound is called as :

- (a) Nitrogen assimilation
- (b) Nitrogen fixation
- (c) Nitrification
- (d) Denitrification

(viii) Fireflies are an example of :

- (a) Bioluminescence
- (b) Photolysis
- (c) Photosynthesis
- (d) Photoisomerisation

(ix) The common application of semiconductors in photochemistry are :

- (a) Photovoltaic cells
- (b) Photocatalysts

- (c) Sensitisers for water splitting
  - (d) All of the above
- (x) \_\_\_\_\_ is the condition for high and low quantum yield.
- (a) For forming the products the molecules in the activated state should be largely unstable and decompose.
  - (b) In the different energy state all the reactant molecule should be.
  - (c) Temperature dependent the reactivity of the molecules should be.
  - (d) None of these
- (xi) In an inner-sphere electron transfer reaction, which of the following Ligands could not act as a bridging Ligand ?
- (a) 1, 10 phenanthroline
  - (b) 4,4' bipyridine
  - (c) pyrazine
  - (d) bis (4-pyridyl) methane

(xii) Photochemical activation is highly selective. This statement is :

- (a) True
- (b) False
- (c) Sometime true
- (d) None of these

### **SECTION-B**

#### **( Very Short Answer Type Questions )**

**Note :** Attempt **any five** questions. Each question carries **02** marks. [5x2=10]

2. (i) What is excitation ?
- (ii) Give the example of bimolecular deactivation.
- (iii) Give two example of Photoreduction.
- (iv) What is primary and secondary process ?
- (v) What do you mean by metal complex sensitizer ?

- (vi) Define Quantum yield.
- (vii) What is metal colloid system ? Give example.

### SECTION-C

#### ( Short Answer Type Questions )

**Note :** Attempt **any five** questions. Each question carries **04** marks. [4x5=20]

- 3.
- (i) Write the Energy content of excited state.
  - (ii) Write short note on stopped flow techniques.
  - (iii) Explain Lability in Ligand field photochemistry.
  - (iv) Compare excited state of metal complexes with organic compounds.
  - (v) Describe the carbon dioxide reduction.
  - (vi) Explain energy transfer under condition of weak interaction and strong interaction-exciple formation.
  - (vii) Discuss the role of spin orbit coupling.

## SECTION-D

### ( Essay Type Questions )

**Note :** Attempt **any three** questions. Each question carries **10** marks. [3x10=30]

4. (i) Discuss charge transfer excitation also describe various methods for obtaining charge transfer spectra.
- (ii) Discuss properties of excited state with reference to dipole moment and acid-base strength.
- (iii) Describe the illustration of reducing and oxidising character of Ruthenium  $2^+$  (bipyridal complex); comparisin with Fe (bipy).
- (iv) Write short notes on the following :
- (a) Radiative and Non-Radiative Process
- (b) 2,2'-bipyridine and 1, 10 phenanthroline complexes of metal complexes

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