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**AI—114—2017**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Fourth Semester) EXAMINATION**

**OCTOBER/NOVEMBER, 2017**

**(CBCS Course)**

**INORGANIC CHEMISTRY**

**Paper XVIII (CH-542/1)**

**(Photo Inorganic Chemistry)**

**(Tuesday, 14-11-2017)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—3 Hours*

*Maximum Marks—75*

*N.B. :— All questions are compulsory.*

1. Answer any *three* out of five : 15
  - (a) State and explain the laws of photolysis.
  - (b) Draw and explain Jablonski diagram.
  - (c) Explain the mechanism of absorption of photoradiation.
  - (d) Discuss the origin of *d-d* transitions. Explain with examples.
  - (e) Describe mechanism of photosynthetic process.
2. Answer any *three* from the following : 15
  - (a) Describe the features of Prompt and Delayed Photochemical reactions.
  - (b) Discuss the ligand field excited states of Ir(III) complexes.
  - (c) Explain the Photo substitution reactions with example.
  - (d) Distinguish between absorption and excitation be complex molecule.
  - (e) Give examples of photochemical processes.

P.T.O.

3. Answer the following :

(a) Discuss the importance of solar energy. 8

Or

Distinguish between radiative and non-radiative process.

(b) Enlist various photochemical stages involved in the chemical reaction. 7

Or

Explain the emission spectra of  $ML_6$  complexes.

4. Answer the following :

(a) What is the principle of photographic system ? 8

Or

Discuss the features of Frank Condon principle.

(b) Explain the photochemical reactions of  $Cr^{3+}$  ion complexes. 7

Or

State and explain photo substitution reactions.

5. (a) Choose the *correct* option from the given alternatives : 5

(i) Grotthuss-Draper law states that light must be ..... by a chemical substance in order for a photochemical reaction to take place.

(a) Destroyed (b) Absorbed

(c) Emitted (d) Reflected

(ii) It is possible for the excited state  $S_1$  to undergo spin inversion and to generate a triplet excited state  $T_1$  having .....

(a) Two unpaired electrons with the same spin

(b) One unpaired electrons with the same spin

(c) Two unpaired electrons with the opposite spin

(d) One paired electrons with the same spin

- (iii) Iodine combines with starch, which exhibits an intense blue color due to .....
- Ligand to metal charge transfer
  - d-d* transition
  - Metal to ligand transition
  - Charge-transfer band.
- (iv) ..... is a powerful technique to assign and characterize charge transfer bands in LMCT complexes.
- Resonance IR spectroscopy
  - Electronic Spin Resonance
  - Resonance Raman Spectroscopy
  - X-ray Resonance
- (v) For inorganic complexes, the typical molar absorptivities,  $\epsilon$ , are about ..... because these transitions are Laporte allowed.
- 50000 L mol<sup>-1</sup> cm<sup>-1</sup>
  - 50 L mol<sup>-1</sup> cm<sup>-1</sup>
  - 5 L mol<sup>-1</sup> cm<sup>-1</sup>
  - 1000 L mol<sup>-1</sup> cm<sup>-1</sup>
- (b) Write brief notes on (any two) :
- LMCT charge transfer spectra
  - Integrated excited state
  - Flash photolysis.

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