

This question paper contains **3** printed pages]

**AI—116—2017**

**FACULTY OF SCIENCE**

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

**NOVEMBER/DECEMBER, 2017**

**(CBCS Pattern)**

**PHYSICAL CHEMISTRY**

**(CH-542/3)**

**(Photo-Chemistry)**

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

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

*Time— Three Hours*

*Maximum Marks—75*

*N.B. :— (i) Attempt all questions.*

*(ii) Use of log table and calculator is allowed.*

1. Solve any *three* of the following : 15
  - (a) Explain in detail effect of light intensity on photochemical reaction.
  - (b) Write a note on phosphorescence.
  - (c) Explain collision in solution.
  - (d) Write note on transition metal complexes.
  - (e) Explain in brief photosynthesis in plants.
2. Solve any *three* of the five : 15
  - (a) How is the EMR related to matter ?
  - (b) Explain photodissociation and gas phase photolysis.
  - (c) Explain brief kinetic and optical collision.
  - (d) Write a note on photoreduction.
  - (e) Write a note on delayed fluorescence.
3. Solve the following :
  - (a) What are types of photochemistry ? Derive an expression for photophysical kinetics of unimolecular reactions. 7
  - (b) State laws of photochemistry. A system is irradiated for 20 min. and is found to absorb  $4 \times 10^{18}$  quantum per second. If the amount decomposed is  $3 \times 10^{-3}$  mole and  $N = 6.023 \times 10^{23}$ . Calculate the quantum efficiency of reaction. 8

P.T.O.

Or

- (a) Explain quenching of foreign substances. 7
- (b) What is an actinometer. Describe how a uranyl oxalate actinometer may be used ? 8
4. Answer the following :
- (a) What is meant by photo-oxygenation ? Describe in brief cyclo-addition reaction. 7
- (b) Explain Lambert-Beer's law. What percentage of light will be transmitted through two cells put together in the flash of light if their individual transmissions are 60% and 30%. 8
- Or
- (a) Derive an expression for sternvolmer equation. 7
- (b) Explain in detail LASER and MASER. 8
5. (A) Select the *correct* alternatives from the following : 5
- (1) In photochemical reaction, the absorption of light takes place in .....
- (a) Primary process only
- (b) Secondary process only
- (c) Either primary or Secondary process
- (d) Both primary and secondary process
- (2) The substance which initiate a photochemical reaction but itself does not undergo any chemical change is called .....
- (a) Catalysis
- (b) Fluorescent
- (c) Sensitizer
- (d) None
- (3) The reaction which are caused by heat and in the absence of light are called .....
- (a) Photochemical reaction
- (b) Catalytic reaction
- (c) Exothermic reaction
- (d) Thermal and dark reaction

- (4) Photochemical decomposition of a substance is called .....
- (a) Thermal dissociation
  - (b) Thermolysis
  - (c) Photolysis
  - (d) None
- (5) For reaction, that obey Einstein law :
- (a)  $\phi = 1$
  - (b)  $\phi > 1$
  - (c)  $\phi < 1$
  - (d)  $\phi = \alpha$
- (B) Write short notes on (any *two*) :
- (a) State diagram
  - (b) Chemiluminescence
  - (c) Solar energy conversion

10