

PG CBCS
M.SC. Semester-III Examination, 2021
CHEMISTRY
PAPER: CEM 303
(INORGANIC SPECIAL)

Full Marks: 40

Time: 2 Hours

Answer any FOUR questions from the following: 4x10 =40

1. (a) Draw the active site structure of nitrate reductase (NR) and explain the mechanism of the reduction of nitrate (NO_3^-) to nitrite (NO_2^-) by NR.
 (b) Discuss photochemical reactions of PS I and PS II in photosynthesis? 5+5
2. (a) How photodecomposition of $\text{Fe}(\text{C}_2\text{O}_4)_3^{3-}$ occurs?
 (b) Give an example of linkage photo isomerisation.
 (c) Draw the active site structure of cytochrome.
 (d) In the presence of air $[\text{Fe}(\text{CN})_6]^{4-}$ in CHCl_3 is immediately oxidised to $[\text{Fe}(\text{CN})_6]^{3-}$ in the dark.-Why? 4x2.5
3. (a) Describe the photochemistry of Cr(III) in solid state laser system.
 (b) What is meant by thexi state? Write the characteristics of this state.
 (c) What is catalytic converter? 4+4+2
4. (a) How can you distinguish between the static and dynamic quenching of fluorescence.
 (b) Write down the photochemical products of $[\text{Cr}(\text{NH}_3)_5(\text{NCS})]^{2+}$ in 0.1(N) H_2SO_4 .
 (c) Write various photochemical processes that occur in a molecule by bimolecular process.
 (d) Write down the criteria to be fulfilled by a compound for functioning as a good photosensitiser. 2+2+4+2
5. (a) Briefly discuss the active site structure of superoxide dismutase and its role in human body.
 (b) Define quantum efficiency of a photochemical reaction.
 (c) What is chemiluminescence? Give an example. 6+2+2
6. (a) Discuss the mechanism of action of the enzyme Xanthine oxidase.
 (b) What is the role of cerium salt in the process of photochemical splitting of water molecule?
 (c) Distinguish between fluorescence and phosphorescence. 5+2+3
7. (a) Discuss the active site structure of catalase and explain the disproportionation of H_2O_2 by this enzyme.

(P.T.O.)

(2)

- (b) Which enzyme plays a major role on the detoxification of sulphite compound? Draw its active site structure and indicate the steps involves in this conversion. 4+6
8. (a) Obtain Stern –Volmer equation for quenching of fluorescence.
- (b) What is photosensitized reaction? Give an example.
- (c) What is meant by photochromism? Give an example. 6+2+2
9. Draw Tanabe -Sugano diagram for Cr(III) octahedral complexes and describe associated photochemical process of $\text{NH}_4[\text{Cr}(\text{NCS})_4(\text{NH}_3)_2]$ complex. 3+7
10. Describe the photochemical reduction and oxidation of water molecule using $[\text{Ru}(\text{bpy})_3]^{2+}$ as photosensitiser. 10
