

M. Sc DEGREE END SEMESTER EXAMINATION - OCT. 2020 : FEBRUARY 2021**SEMESTER 1 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY****COURSE : 16P1CHET01 / 16P1CPHT01 : INORGANIC CHEMISTRY - I***(For Regular - 2020 Admission and Supplementary - 2019/2018/2017/2016 Admissions)*

Time : Three Hours

Max. Marks: 75

PART A**Answer any 10 (2 marks each)**

1. What is $1/v$ law?
2. What are the hurdles in realising nuclear fusion reactions in earth?
3. In the nuclear fission reaction, $^{235}\text{U}_{92} \rightarrow ^{140}\text{Ce}_{58} + ^{94}\text{Zr}_{40} + ^1_0\text{n} + 6^0_{-1}\text{e}$, calculate the energy released in this process in MeV. Masses of U = 235.0439 amu, Ce = 139.9054 amu, Zr = 93.9063 amu, n = 1.008665 amu and e = 0.00054859 amu.
4. What are photosystems? Give the different photosystems in photosynthesis? How do they differ from each other?
5. What is nitrogenase? Give its structure and function.
6. Discuss the toxic effects of chromium metal in living systems.
7. Identify the first row transition metal for the following 18-electron species: $(\eta^4\text{-C}_4\text{H}_8)\text{M}(\text{CO})_3$
8. What are isolobal fragments? Show that CH is isolobal with $\text{Co}(\text{CO})_3$.
9. The complex bromocarbonylbis(tri-phenylphosphine)iridium(I) undergoes addition reaction quite readily with chloro methane. Why?
10. $\text{Cr}(\text{CO})_5\text{N}_2$ decomposes when warmed. Why?
11. Explain β – elimination reaction. What are the necessary conditions for β – elimination reaction?
12. How the presence of multidentate ligands capable of hapticity change affect the rate of substitution reaction in organometallic complexes?
13. $[\text{HRh}(\text{CO})(\text{PPh}_3)_3]$ is a useful catalyst for the hydroformylation reaction. What influence will it have on the rate of the reaction if an excess of PPh_3 is added to the reaction mixture?

(2 x 10 = 20)**PART B****Answer any 5 (5 marks each)**

14. Explain fast breeder reactors.
15. Explain the different types of nuclear transfer reactions by giving suitable examples.
16. What are peroxidases and catalases? Give the mechanism of their action.
17. Explain the role of manganese enzyme, in the oxygen evolution during photosynthesis?
18. Discuss the polyhedral skeletal electron pair approach (Mingos's rules). Find out the TEC, PEC and predict the structure of $\text{Ru}_5\text{C}(\text{CO})_{16}$
19. Give the synthesis of $(\text{OC})_5\text{W}=\text{C}(\text{OCH}_3)(\text{C}_6\text{H}_5)$. Discuss the bonding present in Fischer carbenes
20. What are Tollman catalytic loops? Sketch the loop for the cobalt catalyzed conversion of propylene to butyraldehyde using carbon monoxide and hydrogen.
21. Write a note on Monsanto acetic acid process. Draw the catalytic cycle of Monsanto acetic acid process which is used for the synthesis of acetic anhydride.

(5 x 5 = 25)**PART C****Answer any 2 (15 marks each)**

22. Explain in detail the different modes of radioactive decay by giving suitable examples.

23. a) What is cooperativity of hemoglobin? Explain the mechanism. 7 marks.
b) What are nitrogenase enzymes? Explain its structure and action. 8marks.
24. What are sandwich compounds? Discuss the synthesis, structure and bonding present in Dibenzene chromium.
25. Write a note on Zeigler Natta catalyst. Explain the role of Zeigler Natta catalyst in alkene polymerization. How they are used as templates for alkene polymerization?
- (15 x 2 = 30)**