Reg. No ..... Name **22P1006**

M. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022

SEMESTER 1 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY

COURSE : **21P1CHET01 / 21P1CPHT01 : INORGANIC CHEMISTRY - I**

(For Regular - 2022 Admission and Supplementary - 2021 Admission)

Duration : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1. Explain why Carbonyls $Pd(CO)_4$, $Pt(CO)_4$ do not exist where as $Ni(CO)_4$ exist as a stable compound? (An)
2. $Cr(CO)_5N_2$ decomposes when warmed. Why? (An)
3. How the presence of multidentate ligands capable of hapticity change affectthe rate of substitution reaction in organometallic complexes? (A)
4. $(H_3Si\text{-}CH_2\text{-})_4Cr$ is more stable than $(H_3C\text{-}CH_2\text{-})_4Ti$, why? (A)
5. In Monsanto acetic acid process, one of the step is the oxidative addition of CH_3I to $[Rh(CO)_2I_2]^-$ but CH_3I is not a initial reactant in this process. How this is generated in the reaction. (A)
6. Early transition metal halides can function as good Zeigler Natta catalystalong with aluminum alkyls but not late transition metal halides. Why? (A, CO 2)
7. What are MRI contrast agents? (A, CO 3)
8. Explain light and dark reactions in photosynthesis. (U, CO 3)
9. Discuss on the simultaneous determination of Zn^{2+} and Cu^{2+} by radiometrictitration (A, CO 4)
10. What do you mean by fission yields? (R, CO 4)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11. Calculate the TEC, PEC and predict the structures of a) $Ru_5(CO)_{16}C$ b) $[Os_5(CO)_{15}]^{2-}$ (An)
12. Draw the structure of K[PtCl3(C2H4)]. How is the synergic effectoccurs in these compounds? (An)
13. Write a note on rearrangement reactions in organometalliccompounds. Suggest suitable examples. (U, CO 1)
14. Explain the role of heteroatom during alkene or alkyne insertion to arene componds. (An, CO 2)
15. Explain the regioselectivity to produce alkyl-boron compounds using transition metal catalyst under photochemical condition. (An, CO 2)

16. What are rubredoxin and ferredoxin? Discuss their structural features and functions. (A, CO 3)

17. Write a short note on Sodium-Potassium pump. (U, CO 3)

18. Explain the mechanism involved in radiolysis of water. (U, CO 4)

(2 x 6 = 12)

PART C

Answer any 2 questions **Weights: 5**

19. Distinguish between Fischer and Schrock carbenes. How are they prepared? Explain the bonding scheme present in these carbenes. (An, CO 1)

20. Give an account on C-H activation and functionalization reactions of arenes using organometallic catalysts. (An, CO 2)

21. Discuss the structural features of hemoglobin and myoglobin. Explain the mechanism of oxygen transport by hemoglobin. (A, CO 3)

22. a) Write a note on fluxional isomerism exhibited by organometallic compounds. How NMR spectroscopy is useful to study the fluxionality in various organometallic compounds. (U, CO 2, CO 4)

b) Explain the basic principles of G.M. and proportional counters used in radioactive counting.

(5 x 2 = 10)

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Describe the key concepts of inorganic and organometallic chemistry including those related to synthesis, reaction chemistry, and structure and bonding	A	13, 19	7
CO 2	Explain stability of organometallic compounds and clusters, and their application as industrial catalysts.	U	6, 14, 15, 20, 22	15
CO 3	Categorize the interaction of different metal ions with biological ligands	An	7, 8, 16, 17, 21	11
CO 4	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications	A	9, 10, 18, 22	9

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;