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Reg. No. : .....

Code No. : 5881 **Sub. Code : PCHM 32**

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2020.

Third Semester

Chemistry — Core

INORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Among the following the unstable carbonyl species is

(a) $Mn(CO)_5Cl$ (b) $[Mn(CO)_{15}]^-$

(c) $Mn_2(CO)_{10}$ (d) $Mn(CO)_5$

2. CO bond order is lowest in

(a) uncoordinated CO

(b) cobonded to one metal

(c) CO bridiging two metals

(d) vCO bridiging three metals

3. Which of the following obey 18 electron rule?

(a) $Mn(CO)_3$ (b) $Fe(CO)_5$

(c) $V(CO)_6$ (d) $Fe(CO)_4$

4. Vaska's complex is

(a) $IrCl(CO)(PPh_3)_2$ (b) $(Ph_3P)_2Rh(CO)Cl$

(c) $IrCl(CO)_2(PPh_3)_2$ (d) $(Ph_3P)_3RhCl$

5. Among the following diatomic molecules the one that shows EPR signal is

(a) Li_2 (b) B_2

(c) C_2 (d) O_2

6. The 1H NMR spectrum of $(\eta^5 - C_5H_5)_2Fe$ recorded at room temperature has

(a) One singlet (b) One multiplet

(c) Two singlets (d) Two multiplets

7. In the application of DTA and DSC which of the following parameters is measured for the glasses?

(a) Concentration of the glass

(b) Solubility of the glass

(c) Cooling temperature

(d) Transition temperature

8. Absorbed wavelengths in atomic absorption spectrum appear as

(a) dark background (b) dark lines

(c) light background (d) light lines

9. Give the example for Molecular photosensitizers

(a) Mercury (b) Cadmium

(c) Zinc (d) Sulphur dioxide

10. When a substance absorbs radiation of higher frequency the emission of radiation is continuous for some time even after the incident light is cut off

(a) Phosphorescence

(b) Sensitized fluorescence

(c) Resonance fluorescence

(d) None of these above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) State 18 e-rule with example.

Or

(b) Write a short note on properties of ferrocene.

12. (a) Give a brief note on synthetic gasoline.

Or

(b) Write a note on Monsanto processes.

13. (a) Explain how NMR technique used in the study of fluxionality of inorganic compounds.

Or

(b) State the factors affecting the magnitude of g-values.

14. (a) Write a note on thermometric titration.

Or

(b) State the factors affecting the TGA curves.

15. (a) Write a note on photochemical properties of $[Ru(bpy)^3]^{2+}$ complex.

Or

(b) State and explain Frank Condon principle.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Account on the substitution reactions of metal carbonyls.

Or

(b) Write an essay on structural features and bonding of dinitrogen complexes.

17. (a) Write an essay on cyclometallation reactions.

Or

(b) Write a note on heterogeneous catalysis with an example.

18. (a) Sketch and explain the NMR of SF_4, P_4S_3, HPF_2, $[HNi(PPh_3)_4]^+$.

Or

(b) Sketch and explain EPR of

(i) $[CoF_6]^{4-}$

(ii) $[CrF_6]^{3-}$ and

(iii) $[VO(H_2O)_6]^{2+}$

19. (a) Discuss the applications of DTA.

Or

(b) Account on AAS.

20. (a) Write an essay on electron transfer reactions.

Or

(b) Account on application of inorganic photochemistry in solar energy.

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