PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2019
(First Semester)

Branch - **CHEMISTRY**

INORGANIC CHEMISTRY -1

Time : Three Hours Maximum : 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 Which of the following statement is not correct?
(i) d -d transition is responsible for colour of the complex
(ii) Ao>P, then the complexes are low-spin complexes
(iii) AQ <P, then the complexes are high-spin complexes
(iv) [FeFfi] ' ion is a low spin complex

2 Which of the following ion has zero CFSE?
(i) Fe^{2+} (ii) Zn^{2+}
(iii) Co^{3+} (iv) Ni^{2+}

3 Which among the following electronic transition is laporte forbidden?
(i) s ->p (ii) p - > s
(iii) p —»d (iv) d —> *d*

4 With increase in temperature magnetic susceptibility of anti-ferromagnetic material?
(i) Increases (ii) Decreases
(iii) First decreases thenincreases (iv) First increases then decreases

5 Which of the following is having higher trans effect?
(i) NH_3 (ii) CN"
(iii) en (iv) Cl"

6 Which statement is correct about the mechanism of electron transfer?
(i) electron transfer may occur by an inner or outer sphere mechanism depending on the system
(ii) long range electron transfers occur by outer sphere mechanism
(iii) Marcus-Hush theory applies to inner sphere mechanism
(iv) In an inner sphere mechanism, electron transfer between two metal centres involves a bridging ligand

7 A complex [Mabcd] can exhibit enantiomerism if it possesses
(i) square planar geometry (ii) Td geometry
(iii) Oh geometry (iv) square pyramid geometry

8 Which of the following isomerism is shown by $[Cr(gly)_3]$?
(i) Optical (ii) Geometrical
(iii) neither geometrical nor optical (iv) both geometrical and optical

9 Identify the soft base :
(i) CH_3COOO" (ii) H-
(iii) NO^{3}’ (iv) $C0_3^{2}$'

10 Protic solvent is
(i) $CC1_4$ (ii) CHCI3
(iii) C_6H_6 (iv) NH_3

Cont...

SECTION - B (25 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Bring out the postulates of VBT.

OR

b Enlist the factors affecting the crystal field splitting energy (A) .

12 a Discuss how 10 Dq and B values are calculated for Ni^{2+} octahedral complex.

OR

b How is magnetic susceptibility determined by Guoy's balance method?

13 a Outline the mechanism of substitution reactions in octahedral complexes.

OR

b What are complementary and non-complementary electron transfer reactions and explain their mechanism?

14 a Suggest a simple experiment to distinguish between the cis and trans isomers of the complex $[Pt(NH_3)_2Cl_2]^{10}$.

OR

b Examine the stereoisomerism in metal complexes with coordination number 6.

15 a Write an explanatory note on symbiosis in acids and bases.

OR

b Specify the type of Acid-Base interaction from the following :

(a) $NH_4^+ + NH_2' \text{—>} 2\ NH_3$	(i) Lux - Flood theory
(b) 2P0C1$_3$ ^$OPCl_2^+$ + OPCLf	(ii) Lewis theory
(c) Si0$_2$ + $H_2$0 -> H_2Si0_3	(iii) Lowry - Bronsted theory
(d) R;\ • BF* ->R;\'B1$_3$	(iv) Usanovich theory
(e) OFF + C0$_2$ HOCOT	(v) Solvent system theory

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

16 a On the basis of CFT, account for the following : While [CoF^' is paramagnetic, $[Co(NH_3)_6]^{3}$' is diamagnetic.

OR

b What is Jahn - Teller effect? Specify the condition for slight and strong distortion in octahedral complex.

17 a Discuss the electronic spectra of d^1 and d^9 ions.

OR

b Delineate the Tanabe - Sugano diagram for the complex $[Cr(NH_3)6]^{3+}$

18 a Enumerate the theories of trans effect.

OR

b Explain the outer sphere mechanism with suitable examples.

19 a Describe the geometrical isomerism in coordination compounds.

OR

b Explain the concept of optical isomerism in octahedral complex of type $MA4B_2$, MA_3B_3 and $MA_2B_2C_2$, where M is the central metal atom, A, B and C are neutral Monodentate.

20 a State HASB principle. Explain the classification and applications of HSAB principle.

OR

b Account the following : (5+3)

(i) Pearson's principle of acid base (ii) Super acids

Z-Z-Z END