

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(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

(10x1 = 10)

- 1 The CFSE for d^4 in high spin octahedral complex is

(i) $18Dq$	(ii) $6Dq$
(iii) $-6Dq$	(iv) $-16Dq + P$
- 2 The Jahn-Teller distortion occurs whenever which of the following orbitals are unequally occupied

(i) d_{xy} and d_{z^2}	(ii) d_{xy} and d_{zx}
(iii) d_{zx} and $d_{y^2-x^2}$	(iv) d_{xy} , d_{yz} and d_{zx}
- 3 The ground state term symbol of V^{3+} ion is

(i) V ,	(ii) 4F_3
(iii) 3F_2	(iv) 5D_4
- 4 Which among the following statement is correct with Tanabe - Sugano diagram?
 - (i) Ground state term is not taken as base line
 - (ii) The splitting pattern of higher energy terms are not considered
 - (iii) The splitting free ion term in weak and strong fields are considered
 - (iv) The splitting free ion term in weak field is alone considered
- 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 Which one of the following square planar complex shows geometrical isomerism?

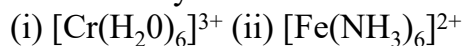
(i) MA_4	(ii) MA_3B
(iii) $M(AA')_2$	(iv) $M(AA)_2$
- 8 Optical isomerism is shown by

(i) $[Ni(CN)_4]^{2-}$	(ii) $[Co(en)_3]^{3+}$
(iii) $[Cr(CO)_4]$	(iv) $[Pt(NH_3)_4]^{2+}$
- 9 Which of the following is a soft acid?

(i) Be^{2+}	(ii) M^{2+}
$2+$	$/s;A$

SECTION - B (25 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 x 5 = 25)

11 a Determine the spin magnetic moment of the following complexes according to VB theory as well as CFT.



OR

Explain the spectrochemical series.

12 a State and explain Laporte allowed and forbidden selection rules.

OR

b Derive the term symbols for d^2 configuration.

13 a Explain the rate law for nucleophilic substitution in square planar complexes.

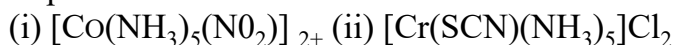
OR

b Discuss the trans effect with suitable examples.

14 a Explain why the square planar complexes do not show optical isomerism.

OR

b Explain the structures and mention the names of all possible isomers of



15 a Arrange the following acids in the order of increasing acid strength. Give suitable explanation : HOCl , HClO_3 , HClO_2 , HClO_4

OR

b Discuss the Usanovich concept of acids and bases.

SECTION -C (40 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 x 8 = 40)

16 a Interpret the splitting of d-orbitals in octahedral field according to CFT.

OR

b Construct the molecular orbital diagram for $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{CoCl}_4]^{2-}$ complexes.

17 a Interpret the Orgel diagram for d^2 and d^8 systems.

OR

b Define magnetic susceptibility. How will you determine it by Guoy's method?

18 a Criticize the substitution reactions in octahedral complexes with suitable examples.

OR ,,

b Interpret reorganization electron transfer reaction.

19 a Analyse why tetrahedral complexes are unable to exhibit geometrical isomers.

OR

b Using suitable example, justify optical isomerism in octahedral complexes.