Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Science

End Sem (Even) Examination May-2022

CH5CO05 Inorganic Chemistry -II

Programme: M.Sc. Branch/Specialisation: Chemistry

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Spectroscopically detectable energy levels are termed as: **1**
(a) Microstates (b) Terms
(c) Orbitals (d) None of these

ii. Electronic spectrum of d^5 ions are- **1**
(a) Laporte's forbidden (b) Spin forbidden
(c) Both (a) and (b) (d) None of these

iii. The magnetic susceptibility of a paramagnetic material is- **1**
(a) Independent of temperature
(b) Increase with increase in temperature
(c) Decrease with decrease in temperature
(d) None of these

iv. Susceptibility of diamagnetic substance is- **1**
(a) Positive (b) Negative (c) Both (a) and (b) (d) None of these

v. Number of unpaired electrons in oxyhaemoglobin- **1**
(a) 0 (b) 2 (c) 4 (d) 6

vi. Metals in carbonyls are- **1**
(a) Low oxidation state
(b) High oxidation state
(c) Both (a) and (b)
(d) None of these

vii. By Wade's rules, which cluster description is incorrect? **1**
(a) $[B_5H_8]^-$ is a nido cluster
(b) $[B_6H_6]^{2-}$ is a closo cluster
(c) $[B_{10}H_{13}]^-$ is an arachno cluster
(d) $[B_4H_9]^-$ is an arachno cluster

P.T.O.

viii. Which of the following compound exists in liquid state? **1**
(a) Diborane (b) Pentaborane
(c) Decaborane (d) Borane

ix. Specific rotation depends on- **1**
(a) Concentration (b) Wavelength
(c) Temperature (d) All of these

x. Optical rotatory dispersion phenomenon was first studied by- **1**
(a) Fresnel (b) Orgel (c) Tanabe Sugano (d) Frank

Q.2 i. Describe the relaxation from Laporte's rule. **2**

ii. Draw the Orgel diagram of d^5 system. **3**

iii. Write selection rules of electronic spectroscopy. **5**

OR iv. The electronic spectrum of $[Cr(CN)_6]_{2+}$ shows absorption bands of 264 nm, 310 nm and 378 nm. Determine the value of Δo and β. **5**

Q.3 i. Write a note on diamagnetism. **2**

ii. Explain magnetic exchange coupling with example. **8**

OR iii. Explain anomalous magnetic moment. Also give reasoning to account for it. **8**

Q.4 i. Explain synergistic bonding in carbonyls. **3**

ii. Write a detailed note on dinitrogen and dioxygen complexes. **7**

OR iii. Describe the complexes containing tertiary phosphine as ligand with reference to preparation, properties and uses. **7**

Q.5 i. Write a note on classification and nomenclature of Borane. **4**

ii. Describe preparation methods for the carboranes. **6**

OR iii. Discuss structure and bonding in closo, nido and arachno boranes. **6**

Q.6 Attempt any two:

i. Explain cotton effects and its applications. **5**

ii. Describe Kerr effect and its applications. **5**

iii. Discuss the application of ORD and CD for the absolute determination of configuration. **5**

******

Scheme of Marking

Faculty of Science

End Sem (Even) Examination May-2020

Inorganic Chemistry-II CH5CO05

Programme: M.Sc. | Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	B	1
	ii)	B	1
	iii)	C	1
	iv)	B	1
	v)	B	1
	vi)	A	1
	vii)	A	1
	viii)	C	1
	ix)	D	1
	x)	A	1
Q.2	i.	Laporte's rule.	2
	ii.	Orgel diagram	3
	iii.	selection rules → 5 marks each part	5
OR	iv.	Δ_o (2.5) Δ_t (2.5)	5
Q.3	i.	dia magnetism explain	2
	ii.	Magnetic exchg (3) Example (5)	8
OR	iii.	Antimolar m.m – (3) – reason (5)	8
Q.4	i.	Bonding CO —	3
	ii.	dinitrogen (4) dioxygen (3)	7
OR	iii.	Phosphine 2+2+3'	7
Q.5	i.	Classifn (2) nomenclature (2)	4
	ii.	Methods — Prepn — 2+2+2 (At least 3 prep)	6
OR	iii.	Close – 2, nido – 2, arachno – 2	6
Q.6			
	i.	Cotton effects – 2, Appl^n – 3	5
	ii.	Kerr effects – 2, Appl^n – 3	5
	iii.	ORD & CD ⇒ Appl^n – atleast 2. (5)	5

******