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**M.Sc. (IInd Semester) (CBCS Main)
Examination, 2021**

CHEMISTRY

(Inorganic Chemistry - 2)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Passing Parks : 25

Note : Attempt questions from all **four** sections as directed.
The marks given in right hand side indicate full marks.

SECTION-A

(Objective Type Questions)

Note : Attempt **any ten** questions. Each question carries **One** marks.

[1x10=10]

1. (i) As per the Bronsted and Lowry concept, a Base is substance that :

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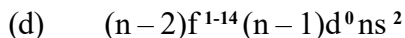
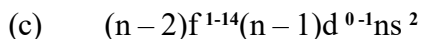
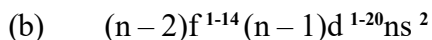
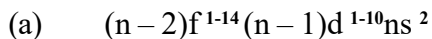
(1)

[P.T.O.]

- (a) Accepts proton
 - (b) Donates proton
 - (c) Accepts neutron
 - (d) Donates neutron
- (ii) Which of these is not an acid, despite being a Hydrogen compound?
- (a) CH_4
 - (b) CCl_3COOH
 - (c) H_2S
 - (d) HF
- (iii) Which of the following cannot be a Ligand?
- (a) Ni^{2+}
 - (b) Cl^-
 - (c) H_2O
 - (d) NH_3

- (iv) How many donor atoms can EDTA^{4-} Ligand bind through ?
- (a) 2
 - (b) 4
 - (c) 6
 - (d) 8
- (v) Carboxypeptidase contains :
- (a) Zn (II) and Hydrolysis CO_2
 - (b) Mg (II) and Hydrolysis peptide bond
 - (c) Mg (II) and Hydrolysis CO_2
 - (d) Zn (II) and Hydrolysis peptide bonds
- (vi) The Ligand system present in vitamin B12 is :
- (a) Porphyrin
 - (b) Corrin
 - (c) Phthalocyanine
 - (d) Crown ether

(vii) What is the general electronic configuration of the Lanthanides?



(viii) What is the most common oxidation state of Lanthanide?

(a) +2

(b) +4

(c) +6

(d) +3

(ix) Actinoid compound are more basic than Lanthanoid compound.

(a) True

(b) False

- (x) According to Wade's rule, cluster $[\text{Os}_3(\text{CO})_{12}]$ is type of _____ .
- (xi) The ground state term for chromium ion in $[\text{Cr}(\text{CN})_6]^{4-}$ is _____ .
- (xii) The colour of the nano-gold particles is _____ .

SECTION-B

(Very Short Answer Questions)

Note : Attempt **any five** questions. Each question carries **2** marks.

(25-30 words only)

[2x5=10]

2. (i) What is spectroscopic ground state "term symbol" explain with suitable example.
- (ii) What do you mean by Buffer solutions?
- (iii) What is Carboranes? Also give the classification of carboranes.
- (iv) Write the role of sodium and Zn ions.
- (v) What is stability constant?

- (vi) Write the oxidation state of Lanthanoids and Actinoides.
- (vii) Give two example of Iron-Sulphur proteins.

SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **4** marks.

(250 words only)

[4x5=20]

- 3.
- (i) Evaluate spectroscopic ground state for electronic configuration from d^1 , d^3 , d^5 and d^{10} .
 - (ii) What do you mean by metal cluster? Write down two categories of metal cluster.
 - (iii) Describe the Werner's theory and its application.
 - (iv) Explain the Carbory peptidase and Carbonic anhydrase.
 - (v) Write the concept of Lewis acid-base and its applications.

- (vi) Discuss the electronic configuration and oxidation state of Lanthanoids and Actinoids.
- (vii) Write a short note on Nano-technology.

SECTION-D

(Essay Type Questions)

Note : Attempt **any three** questions. Each question carries **ten** marks. (more than **500** words) [3x10=30]

4. (i) (a) Discuss the colour and spectral properties of Lanthanoids.
- (b) What is Lanthanides contraction? Also discuss its effect and consequences.
- (ii) Write short notes on the following :
- (a) Nitrogen fixation
 - (b) Effective Atomic Number (EAN)
 - (c) Magnetic properties of Lanthanides

- (iii) Discuss charge Transfer Spectra. Draw molecular orbital diagram for LMCT and MLCT and give suitable example.
- (iv) (a) Describe the HSAB concept and its application.
- (b) Explain metal carbonyl compound, its classification, preparation and structures.

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