

**B.SC. CHEMISTRY  
THIRD SEMESTER  
INORGANIC CHEMISTRY II  
BSC – 301**

**SET  
A**

[USE OMR FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

**(PART-A: Objective)**

Time: 30 min.

Marks: 20

*Choose the correct answer from the following:*

**1X20=20**

- In a reaction between  $\text{H}_3\text{O}^+$  and  $\text{NO}_2^-$ , the conjugate base of the acid  $\text{H}_3\text{O}^+$  is
  - $\text{H}_2\text{O}$
  - $\text{OH}^-$
  - $\text{H}^+$
  - $\text{OH}^+$
- In the reaction  $\text{F}^- + \text{BrF}_3 \rightarrow \text{BrF}_4^-$ , the KF is considered as -
  - Acid
  - Base
  - Amphoteric
  - Solvent
- $\text{Cu}^{2+}$  ion is
  - Hard acid
  - Borderline acid
  - Soft acid
  - Soft base
- The inorganic polymer used for manufacture of soft contact lenses is
  - Nylon
  - Polyphosphazenes
  - Polysiloxanes
  - Glasses
- The Silicates used for water softening is -
  - Sheet silicate Mica
  - Framework silicate Ultramarine
  - Framework silicate Feldspar
  - Framework silicate Zeolite
- The active metals are
  - Reluctant to get oxidized
  - Reluctant to get reduced
  - Eager to get reduced.
  - None of the above
- Smelting is
  - Oxidation
  - Reduction.
  - Thermit process
  - None of the above.
- The process in which a metal is obtained by simply heating the sulphide ore is called
  - Smelting
  - roasting
  - Pyrometallurgical process.
  - None of the above.
- Pyro metallurgical process refers to
  - Hydrolysis of a metal ore.
  - Heating of oxide with coke.
  - Ionization in water
  - None of the above.

10. In Goldschmidt thermit Process, the metal used for reducing the oxide of another metal is
- Gold
  - Manganese
  - Aluminium
  - None of the above.
11. The hybridization of  $\text{XeF}_6$  molecule is
- $\text{Sp}^3\text{d}^3$
  - $\text{Sp}^3\text{d}^2$
  - $\text{Sp}^3$
  - $\text{Sp}^2$
12. Which of the following statements is incorrect about noble gases?
- They are monoatomic
  - They are colourless
  - They are odourless
  - They all have an outer electronic configuration of  $ns^2np^6$
13. Which among the following noble gases does not form clathrates?
- Argon
  - Xenon
  - Krypton
  - Helium
14. Partial hydrolysis of  $\text{XeF}_6$  gives
- $\text{XeOF}_4$  and  $\text{XeO}_2\text{F}_2$
  - $\text{XeO}_3$  and  $\text{XeO}_2\text{F}_2$
  - $\text{XeOF}_4$  and  $\text{XeOF}_2$
  - $\text{XeO}_3$  and  $\text{XeOF}_4$
15. When Xenon reacts with fluorine in a ratio of 1:5 at a temperature of 873 K it forms
- $\text{XeF}_4$
  - $\text{XeF}_6$
  - $\text{XeOF}_4$
  - $\text{XeF}_2$
16. Anomalous behaviour of first member of each group of the periodic table is due to
- Small size
  - High electronegativity
  - Unavailability of d orbital
  - All of the above
17. Inert pair effect is due to
- Poor shielding of d and f orbitals
  - Reluctance of  $ns^2$  electrons to take part in bonding
  - Both of the above
  - None of the above
18. Polymeric Boron nitride has similar structure with
- Diamond
  - Graphite
  - Diborane
  - None of the above
19. Mixing diborane and ammonia in 1:2 ratio respectively at  $300^\circ\text{C}$  produces
- $(\text{BN})_x$
  - $\text{B}_3\text{N}_3\text{H}_6$
  - $\text{BH}_3\cdot\text{NH}_3$
  - None of the above
20. Chemically borax is
- Sodium metaborate
  - Sodium orthoborate
  - Sodium hexaborate
  - Sodium tetraborate decahydrate

**( PART-B : Descriptive )**

Time : 2 hrs. 30 min.

Marks : 50

**[ Answer question no.1 & any four (4) from the rest ]**

- |       |   |                |
|-------|---|----------------|
| 1. a. | Write the structure of Cyclic-polysiloxane. What are the applications of polysiloxanes?   | 3+2+2+3<br>=10 |
| b.    | What is zone refining? How is impure metal purified by this process?  |                |
| c.    | Write the preparation of XeF <sub>2</sub> .   |                |
| d.    | What is inorganic benzene and why it is called so.  |                |
| 2. a. | What are the factors that determine the Lewis Acidity?  | 3+2+5<br>=10   |
| b.    | Explain why aqueous solution of Na <sub>2</sub> CO <sub>3</sub> is alkaline?  |                |
| c.    | What are the structures of different types of silicates?  |                |
| 3. a. | What are the applications of HSAB principles in the interpretation of the properties of compounds?  | 5+5=10         |
| b.    | Discuss the preparation, structure and applications of polyphosphazenes.  |                |
| 4. a. | What is meant by Parting process? How is it carried out with sulphuric acid?  | 1+4=5          |
| b.    | How is nickel extracted by Mond's process?  | 5              |
| 5. a. | How is zirconium ultra purified by von Arkel-de-Boer process?   | 5              |
| b.    | Write the preparation and chemical properties of XeF <sub>4</sub> .   | 5              |
| 6. a. | Explain the chemical properties and structure of XeF <sub>6</sub>   | 5+5=10         |
| b.    | Explain the clathrates of noble gases and mention its uses.   |                |
| 7. a. | Why it is difficult to titrate boric acid against NaOH and how to overcome the difficulty? Write the structure of all the oxides of nitrogen. | 3+2=5          |

- b. Write preparations and structures of three oxides of phosphorus. 3+2= 5  
Show two reactions where phosphorus acid acts as strong reducing agent
8. a. Why nitrogen forms  $N_2$  and but phosphorus forms  $P_4$  at room temperature? Why  $BiCl_5$  is highly unstable. 2.5+2.5  
=5
- b. Write differences between allotropy and catenation with examples. Explain diagonal relationship with examples. 2.5+2.5  
=5

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