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Reg. No. :

Code No. : 30474 E Sub. Code : CMCH 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

First Semester

Chemistry – Core

INORGANIC CHEMISTRY — I

(For those who joined in July 2021 and 2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The electronic configuration of chromium (At.No.24)

- (a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$
- (b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$
- (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^0$
- (d) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2 4p^6$

2. Identify the degenerate orbitals among the following

- (a) $2s, 2p_x, 2p_y, 2p_z$
- (b) $3p_x, 3p_y, 3d_{x^2-y^2}$
- (c) $2p_x, 2p_y, 2p_z$
- (d) $3p_x, 3p_y, 3p_z, 3d_{x^2-y^2}$

3. Elements of same group are characterized by

- (a) Ionisation potential
- (b) Electronegativity
- (c) Electron affinity
- (d) Number of electrons in the outermost shell

4. Which one of the following represents the electronic configuration of the most electropositive element?

- (a) $[\text{He}]2s^1$
- (b) $[\text{Xe}]6s^1$
- (c) $[\text{He}]2s^2$
- (d) $[\text{Xe}]2s^2$

5. Which among the following is a non polar covalent molecule?

- (a) H_2O
- (b) HCl
- (c) NH_3
- (d) Cl_2

6. Tetrahedral geometry belongs to which one of the following hybridization?

- (a) sp
- (b) sp^2
- (c) sp^3
- (d) sp^3d

7. Beryllium shows diagonal relationship with
- (a) Li (b) Al
(c) B (d) Mg
8. Zeolites are complex compound of _____
- (a) Aluminium and lime
(b) Silica and soda
(c) Aluminium, silica and soda
(d) Lime and soda
9. What do you mean by oxidation?
- (a) Gain of protons (b) Loss of protons
(c) Gain of electrons (d) Loss of electrons
10. Which of the following is a primary standard substance?
- (a) Oxalic acid
(b) Potassium hydroxide
(c) Potassium permanganate
(d) Sodium hydroxide

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PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain Aufbau principle.
Or
(b) Write the significance of Ψ and Ψ^2 .
12. (a) Define electronegativity. How is it determined by Pauling method?
Or
(b) Define ionic radius. How is it determined?
13. (a) On the basis of VSEPR theory arrive the structure of CH_4 molecule.
Or
(b) Define lattice energy. Write down the Born-Lande equation and explain the terms.
14. (a) What are p block elements? Give their general electronic configuration. Give any four examples of elements belonging to p-block.
Or
(b) Write notes on intercalation compounds of alkali metals.

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[P.T.O.]

15. (a) (i) Define solubility product.
(ii) Explain common ion effect.

Or

- (b) Explain the theory of acid-base titration.

PART C — (5 × 8 = 40 marks)

Answer ALL questions by choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What is Pauli's exclusion principle? Illustrate the principle and explain its applications with two examples.

Or

- (b) Write notes on Quantum numbers.

17. (a) Define electronegativity.
(i) Discuss the factors affecting electronegativity.
(ii) How is electronegativity determined by Pauling's and Mulliken's scales?

Or

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- (b) Give the reason for the following:

(i) The second ionization energy of sodium is very high compared to its first ionization energy.

(ii) Electron affinity of fluorine is less than that of Chlorine.

18. (a) Compare valence bond theory with molecular orbital theory.

Or

- (b) Discuss the application of molecular orbital theory to oxygen and explain its paramagnetic nature and bond order.

19. (a) (i) Write a detailed note on sign of atom, ion and ionization energy for p-block elements.

(ii) Discuss inert pair effect.

Or

- (b) (i) Explain the anomalous behaviour of Lithium from I-A group elements and Beryllium from II-A group elements.

(ii) Discuss the diagonal relationship of lithium with magnesium and beryllium with aluminium.

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20. (a) Define the following:

- (i) Molecular mass
- (ii) Mole concept
- (iii) Molar volume
- (iv) Oxidation.

Or

(b) Discuss the principle of gravimetric analysis.
