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Reg. No. :

Code No. : 20399 E Sub. Code : CMCH 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

First Semester

Chemistry — core

Non-Major — INORGANIC CHEMISTRY — I

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Select the electronic configuration of copper from the following :
(a) [Ar] 3d⁸ 4s² (b) [Ar] 3d⁹ 4s²
(c) [Ar] 3d¹⁰ 4s¹ (d) [Ar] 3d⁵ 4s¹
2. Name the principle which tells that electrons are filled in the orbitals in the order of energy.
(a) Hund's rule
(b) Aufbau principle
(c) Pauli's Exclusion Principle
(d) Heisenberg's uncertainty principle

3. Identify the atom which has the highest ionisation energy

(a) Be (b) Mg
(c) Ca (d) Ba

4. Predict the ion which has the highest ionic radius

(a) Na⁺ (b) K⁺
(c) Rb⁺ (d) Cs⁺

5. Express the compound which has highest melting point

(a) NaCl (b) Cl₂
(c) CCl₄ (d) CH₄

6. Find out the molecule which has sp² hybridisation

(a) BF₃ (b) NH₃
(c) BeH₂ (d) PCl₅

7. Predict the element which has the highest electronegativity

(a) Na (b) K
(c) Cs (d) Li

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8. Identify the glass which has an approximate composition of SiO_2 75%, sodium oxide 15%, calcium oxide 8% and aluminium oxide 2%

(a) Soda glass (b) Flint glass
(c) Pyrex glass (d) Safety glass

9. Select the primary standard used in volumetric analysis from the following

(a) NaOH (b) Mohr's salt
(c) H_2SO_4 (d) HCl

10. Calculate the normality of oxalic acid if 63 g of oxalic acid dissolved in one litre of water

(a) 1 N (b) 0.5 N
(c) 0.1 N (d) 0.01 N

SECTION B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Describe briefly the Sommerfield theory of atomic model.

Or

- (b) Examine the stability half-filled and fully filled orbitals with suitable examples.

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12. (a) Discuss briefly the classification of elements in the long form of the periodic table.

Or

- (b) Explain how the ionic and atomic radii vary along the groups and the periods with suitable examples.

13. (a) Examine the Fajan's rule and its applications.

Or

- (b) Sketch the structure of CO_2 and H_2O .

14. (a) Discuss the diagonal relation between Be and Al.

Or

- (b) Describe the chemistry of Portland Cement.

15. (a) Analyse the mechanism of precipitation.

Or

- (b) Distinguish the following :

- (i) Metal ion indicators and pH indicators. (3)
(ii) Acid-base titrations and redox titrations. (4)

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SECTION C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) State and explain the Schrodinger wave equation and significance of Ψ and Ψ^2 .

Or

- (b) Describe briefly the black body radiation and Bohr's theory of atom.

17. (a) Explain briefly how the electron affinity and electronegativity of elements vary along the groups and periods.

Or

- (b) (i) Discuss the various factors affecting ionisation energy. (5)
(ii) How is electronegativity determined by Pauling's method? (5)

18. (a) (i) State Born-Landé equation and explain its significance. (5)
(ii) Describe the factors affecting the lattice energy. (5)

Or

- (b) Compare the VBT and MOT.

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19. (a) Discuss the structure of any four types of silicates.

Or

- (b) Explain briefly the allotropes of phosphorus.

20. (a) Illustrate the confirmatory tests for carbonate, sulphate, borate, phosphate and nitrate.

Or

- (b) Analyse the principle of precipitation from homogeneous solution.

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