(6 pages)

Reg. No. : ....

Code No. : 20666 E   **Sub. Code : EMCH 11**

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2023.

First Semester

Chemistry — Core

GENERAL CHEMISTRY — I

(For those who joined in July 2023 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. The value of the radius of Bohr's first orbit of hydrogen atom is

    (a) 0.0729 nm   (b) 0.0529 nm

    (c) 1.0529 nm   (d) 1.073 nm

2. What is the atomic number of an element with outer electronic configuration $3d^5 4S^1$

    (a) 24   (b) 25

    (c) 26   (d) 29

3. Wave function in quantum mechanics represents

    (a) state of the system

    (b) shape of the system

    (c) probability of the system

    (d) energy of the system

4. Mulliken's scale of electro negativity is based on

    (a) Ionisation energy

    (b) Effective nuclear charge

    (c) Ionisation energy and electron affinity

    (d) Partial ionic character

5. The geometry corresponding to sp^3d hybridisation is

    (a) tetrahedron   (b) square planar

    (c) octahedron   (d) trigonal bipyramid

6. Which of the following molecules has zero dipole moment?

   (a) H_2O (b) NH_3

   (c) SF_4 (d) CCl_4

7. Which among the following is a paramagnetic molecule?

   (a) H_2 (b) HF

   (c) O_2 (d) N_2

8. Identify the compound that has no hydrogen bonding

   (a) H_2S (b) HF

   (c) NH_3 (d) H_2O

9. BF_3 is an example of

   (a) negative nucleophile

   (b) positive electrophile

   (c) neutral nucleophile

   (d) neutral electrophile

10. Which of the following is more acidic?

   (a) CH_3COOH

   (b) $HCOOH$

   (c) CH_3CH_2COOH

   (d) $CH_3CH_2CH_2COOH$

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Explain Planck's quantum theory.

   Or

   (b) Derive de Broglie equation.

12. (a) Distinguish orbit and orbital.

   Or

   (b) State the modern periodic law and explain the position of different blocks of elements in the modern periodic table.

13. (a) Discuss the factors that influence lattice energy.

Or

(b) Distinguish σ bond and π bond.

14. (a) Compare VB and MO theories.

Or

(b) Explain semiconductors using band theory.

15. (a) Explain with suitable examples how the strength of bases are affected by resonance effect.

Or

(b) Explain addition reactions with examples.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Discuss Moseley's experiment and atomic number.

Or

(b) Describe Franck-Hertz experiment to explain the discrete energy states in atoms.

17. (a) Derive Schrondinger wave equation.

Or

(b) Define atomic radius and ionic radius. Explain their significance in the periodic table.

18. (a) How is the lattice energy of an ionic compound determined by Born-Haber cycle? Explain with an example.

Or

(b) (i) State the postulates of VSEPR theory.

(ii) On the basis of VSEPR theory arrive the structure of H_2O and SF_6

19. (a) Discuss the application of VB theory to hydrogen.

Or

(b) Explain Van der Waals forces.

20. (a) What are electrophiles and nucleophiles? Explain their different types with example.

Or

(b) Discuss the structure of carbenes and nitrenes.

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