5. Describe the Bohr's model of atom.
6. Interpret the significance of Ψ and Ψ^2.
7. Explain the Fajans' rules.
8. Distinguish between VB and MO theories.
9. Summarize the inductive effect of different alkyl halide.

SECTION C – (5 x 10 = 50 marks)

ANSWER ALL QUESTIONS

10. A Elaborate the Photoelectric effect and De-Broglie wavelength.

OR

B Explain the terms i) Hund's rule (3marks) ii)Pauli' exclusion principle (3 marks) iii) Aufbau principle (4 marks)

11. A Outline the postulates of quantum mechanics.

OR

B Brief out the following terms.
i) Atomic radii ii) Ionization energy iii) Electron affinity iv) Electro negativity

12. A Calculate the lattice energy of sodium chloride using Born-Haber.

OR

B Demonstrate the postulate of VSEPR theory and predicting shapes of molecules.

13. A Draw the molecular orbital configuration of N_2 and H_2 molecule and its bond order.

OR

B Investigate the Hydrogen bonding and its types and give an example for each one.

14. A Analyze the stability of carbanions and carbocation and explain with example.

OR

B Explain the Resonance effect and Hyperconjugation effect.

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Four Pages
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END SEMESTER EXAMINATION NOV/DEC-2023

First Semester

B.Sc CHEMISTRY

CORE COURSE I – GENERAL CHEMISTRY-I

Time: Three Hours **Maximum: 75 marks**

SECTION A – (15 x 1 = 15 marks)

ANSWER ALL QUESTIONS

1. A black body is a
   - A perfect absorber
   - B perfect emitter
   - C perfect absorber and emitter
   - D none of the above
2. Rutherford carried out experiments in which a beam of alpha particles was directed at a thin piece of metal foil. From these experiments he concluded that
   - A Electrons are massive particles.
   - B The positively charged parts of atoms are moving about with a velocity approaching the speed of light.
   - C the positively charged parts of atoms are extremely small and extremely heavy particles.
   - D The diameter of an electron is approximately equal to that of the nucleus.
3. The Heisenberg Principle states that

A No two electrons in the same atom can have the same set of four quantum numbers.

B Two atoms of the same element must have the same number of protons.

C It is impossible to determine accurately both the position and momentum of an electron simultaneously.

D Electrons of atoms in their ground states enter energetically equivalent sets of orbitals singly before they pair up in any orbital of the set.

4. Two wave functions ψi and ψj are said to be normalized if

A $\int \psi i^* \psi j \, d\tau = 1 ; i = j$

B $\int \psi i^* \psi j \, d\tau = 0 ; i \neq j$

C $\int \psi i^* \psi j \, d\tau = 0 ; i = j$

D $\int \psi i^* \psi j \, d\tau = \psi^2$

5. Which element has the largest atomic radius?

A Li

B Na

C Rb

D F

6. All of the following properties of the alkaline earth metals increase going down the group except

A atomic radius

B first ionization energy

C ionic radius

D atomic mass

7. The valence electrons of representative elements are

A In s orbitals only.

B Located in the outermost occupied major energy level.

C Located closest to the nucleus.

D Located in d orbitals.

8. A π (pi) bond is the result of the

A overlap of two s orbitals.

B overlap of an s and a p orbital.

C overlap of two p orbitals along their axes.

D sidewise overlap of two parallel p orbitals.

9. The hybridization of the oxygen atom in water is

A sp

B sp^2

C sp^3

D dsp^2

10. Which of the following is not a homonuclear diatomic molecule?

A H_2

B N_2

C O_2

D HCl

11. At absolute zero (T = 0 K) conduction band for metals will be

A Fully occupied

B Completely empty

C Partially occupied

D None of above

12. London force is also known as

A Dispersion force

B Van der Waals forces

C Hydrogen bonding

D Covalent bonds

13. Compound undergoing homolytic bond cleavage will lead to formation of _____chemical species.

A Anion

B Cation

C Free radical

D Atoms

14. Relative basic strength of amines does not depend upon

A Inductive effect

B Mesomeric effect

C Steric effect

D Stabilisation of cation by hydration

15. Hyper Conjugation is also known as

A No bond resonance

B Baker-nathan effect

C Both (a) and (b)

D None of these

SECTION B – (2 x 5 = 10 marks)

ANSWER ANY TWO QUESTIONS