Reg. No. : ....

Name : ....

**I Semester B.Sc. Degree CBCSS(OBE)-Regular
Examination, November - 2019
(2019 Admission)
CORE COURSE IN CHEMISTRY
1B01CHE : THEORETICAL AND INORGANIC CHEMISTRY**

Time : 3 Hours   Max. Marks : 40

Instructions : Answer the questions in English only.

SECTION – A

Answer **All** questions. Each question carries **1** mark.   **(4×1=4)**

1. An orbital can accommodate only two electrons; this is a consequence of the rule called_____.

2. The lines of the Paschen series of the hydrogen spectrum arise from the electronic transitions from higher energy levels to the _____ Level.

3. The calculated bond order of O_2^+ is_____.

4. The energy released in the formation of a nucleus from its component nucleons is called_____.

SECTION – B

Answer any **Seven** questions. Each question carries **2** marks.**(7×2=14)**

5. Calculate the wavelength of the spectral line obtained in the Lyman series if the electron in the hydrogen atom has been excited to the 3rd energy level.

6. State and explain Hund's rule of maximum multiplicity.

7. State any two postulates of quantum mechanics.

8. Write the Born-Lande Equation and explain the terms.

9. Explain the structure of NH_3 on the basis of VSEPR theory.

10. Write the MO configuration of O_2 molecule and account for the type of magnetic behaviour shown by it.

P.T.O.

11. Define metallic bond on the basis of free electron model.

12. How does electronegativity vary along a period? Explain the variation.

13. What do you meant by Q values of nuclear reactions?

14. Neutrons are better particles for artificial transmutation than α particles. Why?

SECTION - C

Answer any **Four** questions. Each question carries **3** marks. (4×3=12)

15. Calculate the radius of the first Bohr orbit of a hydrogen atom and calculate the velocity and energy of an electron revolving in it.
    [Given: h = 6.626 x10^{-34} Js, ε_0 = 8.854 × 10^{-12} C^{2}m^{-1}J^{-1}, mass of electron = 9.109 ×10^{-31}kg, and electronic charge =1.602 x 10^{-19} c.

16. Discuss the Davisson-Germer experiment on electron diffraction.

17. Describe the shape of SF$_6$ molecule on the basis of hybridization.

18. Define ionization enthalpy and discuss the factors that determine the ionization enthalpy of an element.

19. How Wilson-Cloud Chamber is used to detect and measure radio activity? Explain.

20. Write a note on radiocarbon dating and its applications.

SECTION - D

Answer any **Two** questions. Each question carries **5** marks. (2×5=10)

21. a) State and explain the de Broglie relation.
    b) Discuss the dual nature of electrons.
    c) What must be the velocity of a beam of electrons if they are to display a de Broglie wavelength of 10 nm? (1½+1½+2)

22. What is Born-Haber cycle? Discuss with respect to NaCl. Give any two applications of Born-Haber cycle

23. a) Discuss the Mulliken scale of electro negativity.
    b) Explain the terms: screening effect and effective nuclear charge. (2½+2½)

24. a) Discuss the applications of radioisotopes as tracers.
    b) Write a short note on breeder reactors. (2½+2½)

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