



K23U 4060

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/  
Improvement) Examination, November 2023  
(2019 Admission Onwards)  
CORE COURSE IN CHEMISTRY  
1B01CHE : Theoretical and Inorganic Chemistry

Time : 3 Hours

Max. Marks : 40

## SECTION – A

Very short answer type. **Each** carries 1 mark. Answer **all** 4 questions. (4×1=4)

1. Write down the electronic configuration of Cu.
2. Give two factors favoring the formation of an ionic compound.
3. Define covalent radius.
4. Name the nuclear power plant located in southernmost part of India.

## SECTION – B

Short answer type. **Each** carries 2 marks. Answer 7 questions out of 10. (7×2=14)

5. Calculate the ionization energy of Hydrogen atom using the Rydberg equation.
6. What is meant by a Hermitian operator ?
7. What is meant by eigen value and eigen function ?
8. State Fajan's rule.
9. What is meant by weak chemical forces ?

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10. Calculate the lattice energy of KCl with Madlung constant 1.8500, equilibrium distance 2.9120 Å and Born exponent 8.
11. What is meant by screening effect ? How does it affect the atomic size ?
12. Define diagonal relationship with an example.
13. How the stability of a nucleus is related to the n/p ratio ?
14. What is the use of  $^{131}\text{I}$  in medical treatment ?

## SECTION – C

Short essay/problem type. **Each** carries 3 marks. Answer 4 questions out of 6. (4×3=12)

15. Explain Planck's interpretation of Black Body Spectra.
16. Derive an expression for Bohr radius. Which state of triply ionized  $\text{Be}^{3+}$  will have same orbital radius as that of the ground state of hydrogen atom ?
17. Explain Born-Haber cycle using the equation  $\text{Mg(s)} + \text{F}_2(\text{g}) \rightarrow \text{MgF}_2(\text{s})$  as the example.
18. Discuss the band theory of solids.
19. Explain the principle behind breeder reactor.
20. Differentiate between nuclear fusion and fission. Give examples.

## SECTION – D

Long essay type. **Each** carries 5 marks. Answer 2 questions out of 4. (2×5=10)

21. Derive the equation for the energy of a particle in 1D box.
22. Draw the MO diagram of NO and calculate the bond order.
23. Explain the Pauling's and Mulliken's scale of electronegativity.
24. What is meant by radio carbon dating ? Calculate the age of a wooden fossil if the  $^{14}\text{C}/^{12}\text{C}$  ratio is 14% that of the atmosphere. Half life of  $^{14}\text{C}$  is 5760 years.