

E 2445

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Reg. No.....

Name.....

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MAY 2016**

**Second Semester**

**Core Course—THEORETICAL AND INORGANIC CHEMISTRY**

(Common for B.Sc. Chemistry Model I, Model II, B.Sc. Petrochemicals, B.Sc. Chemistry Environment and Water Management)

[2013 Admission onwards]

Time : Three Hours

Maximum Marks : 60

**Part A**

*Answer all questions.*

*Each question carries 1 mark.*

1. What is Q value of nuclear reaction ?
2. What is half life period of a Radioactive substance ?
3. State Heisenberg's uncertainty principle.
4. Write Schrodinger wave equation.
5. What is ionisation enthalpy ?
6. Why ionic radius of  $\text{Al}^{3+}$  is greater than  $\text{Al}^{3+}$  ?
7. Draw the shape of  $\text{PCl}_3$  molecule.
8. What is solvation enthalpy ?

(8 × 1 = 8)

**Part B**

*Answer any six questions.*

*Each question carries 2 marks.*

9. What is radioactivity ? In what unit it is measured ?
10. What is meant by magic number ?
11. Which of the following electronic configuration is correct for Cu atom ? Give reason.  
[Ar]  $3d^{10} 4s^1$ , [Ar]  $3d^9 4s^2$ .
12. Write few characteristics of Ionic compounds.
13. Why the electron affinity of fluorine is less than that of chlorine ?
14. What are Vander Waal's forces ?

Turn over

15. Discuss the hybridisation in  $\text{ClF}_3$  molecule.
16. Why the ionisation energy decreases in going from Top-bottom in a group ?
17. What is N/P ratio ? How it is related to nuclear stability ?
18. Calculate the wavelength of the matter wave associated with a particle of mass 100 gm. moving with a velocity of 1000 cm/s.

(6 × 2 = 12)

### Part C

*Answer any four questions.  
Each question carries 4 marks.*

19. Explain Geiger-Nuttall Rule.
20. What are radioactive tracers ? Explain carbon dating and Rock dating.
21. Discuss briefly the four quantum numbers.
22. Write down the Born-Haber cycle of NaCl.
23. State and explain Fajan's rule.
24. What is meant by hydrogen bonding ? Discuss the nature and consequence of hydrogen bonding.

(4 × 4 = 16)

### Part D

*Answer any two questions.  
Each question carries 12 marks.*

25. (a) Write note on : (i) nuclear fission and ; (ii) fusion.  
(b) Discuss in detail liquid-drop model for nuclear structure.
26. (a) Discuss Bohr's model of atomic structure ? Derive Bohr's equation for the energy of electron in hydrogen atom.  
(b) Describe Slater's Rule ? Discuss their applications.
27. (a) Derive Born-Landé equation.  
(b) What is valence bond theory ? Explain.
28. (a) Explain the term electron negativity. Discuss the factors which influences the electron negativity of an atom.  
(b) Draw the molecular level diagram of  $\text{O}_2$  and CO molecule. Calculate bond order. Comment on their magnetic properties.

(2 × 12 = 24)