

**MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)**  
**M.Sc. (Chemistry) Sem-I : WINTER- 2022**  
**SUBJECT : INORGANIC CHEMISTRY - I**

Day : Friday

Time : 02:00 PM-05:00 PM

Date : 6/1/2023

**W-20140-2022**

Max. Marks : 60

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**N.B.:**

- 1) All questions are **COMPULSORY**.
  - 2) Figures to the right indicate **FULL** marks.
  - 3) Answers to both the sections should be written in **SEPARATE** answer book.
  - 4) Draw neat and labelled diagrams **WHEREVER** necessary.
  - 5) Use of non-programmable **CALCULATOR** is allowed.
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**SECTION-I**

**Q.1** Answer any **THREE** of the following: **(15)**

- a) Write the Schrodinger's equation for a particle revolving in a three dimensional box and explain the significance of each term present in this equation.
- b) Define Quantum number. Write the four quantum numbers and explain in detail AQN and MQN with suitable examples.
- c) Explain why the H-O -H bond angle in water is not  $109^{\circ}-27'$ ?
- d) Write the Born -Lande' equation. Explain the meaning of the terms present in it.
- e) Define the Pauli's Exclusion principle and explain it with a suitable example.

**Q.2** A) Answer any **TWO** of the following: **(10)**

- i) Write the merits and demerits of valence bond theory.
- ii) Summarize VSEPR rules. Explain their uses to study the structure of molecules.
- iii) Explain the De Broglie's hypothesis.

**B)** Solve any **ONE** of the following: **(05)**

- i) Write the electronic configuration of Mg atom and give the quantum numbers to the valence electron in the last orbital.
- ii) The mass of a particle (m) is  $1.6 \times 10^{-19} \text{ kg}$  moving with its velocity (v) is  $3.0 \times 10^8 \text{ cm/sec}$   
Calculate the wavelength ( $\lambda$ ) of this particle.  
(Given Plank's constant ( $h$ ) =  $6.628 \times 10^{-27} \text{ ergs / sec}$ )

**P. T. O.**

## SECTION-II

**Q.3** Answer any **THREE** of the following: **(15)**

- a) What are Ionic solids and covalent solids? Discuss with suitable example.
- b) Write the members of halogen group. Why they are known as halogens? Explain anomalous behaviour of Fluorine in halogen group.
- c) Explain following types of defects with suitable examples.  
i) Schottky defect                      ii) Frenkel defects
- d) Discuss phosphonitrilic compounds with suitable examples.
- e) Draw the structures of following Xenon compounds.  
i)  $\text{XeF}_4$                       ii)  $\text{XeOF}_4$                       iii)  $\text{XeF}_6$   
iv)  $\text{XeO}_2\text{F}_2$                       v)  $\text{XeF}_2$

**Q.4** Answer any **THREE** of the following: **(15)**

- a) What are n-type and p-type semiconductors? Why silicon doped with Arsenic shows n-type semiconductivity?
- b) Write a comparison between Amorphous and Crystalline solids.
- c) What are applications of Noble gases?
- d) Compare Organic and Inorganic polymers.
- e) Write a note on 'Interhalogen compounds'.

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