

**October 2025**

**B.A./B.Sc.**

**First Semester**

**MINOR – 1**

**CHEMISTRY**

*Course Code: CHN 1.11*

(Atomic Structure, Periodicity of Elements & Chemical Bonding)

*Total Mark: 50*

*Pass Mark: 20*

*Time: 2 hours*

*I. Answer the following questions.*

1. (a) Write the Bohr's postulates and mention any of its two limitations. 3+2=5  
(b) State and explain the Heisenberg's uncertainty principle. 4  
(c) Write the electronic configuration of the following elements: 3  
(i)  $\text{Cr}_{24}$  (ii)  $\text{Mg}_{12}$   
(iii)  $\text{F}_9^-$
  
2. (a) Define an ionic bond. Explain with an example. Give three general characteristics of it. 1+1+3=5  
(b) What is Madelung's constant for NaCl? 1  
(c) Write a short note on each of the following: 2×3=6  
(i) Dipole-dipole interaction  
(ii) Ion-dipole interactions  
(iii) Polarising power and polarizability
  
3. (a) What is hybridisation? With pictorial representation discuss  $\text{sp}^3$  hybridisation. 1+3=4  
(b) Based on VSEPR theory discuss the shape of  $\text{BO}_3^{-3}$  ion and  $\text{H}_2\text{S}$  molecule. 2+2=4  
(c) Write the MO electronic configuration of  $\text{F}_2$  molecule. Calculate the bond order and draw the MO energy level diagram. 1+1+2=4

*II. Answer any two of the following questions.*

4. (a) What are isoelectronic ions? Give example. 3  
(b) Discuss the shapes of p orbitals in detail. 4
5. (a) Discuss the Born-Haber cycle for NaCl solid crystal. 4  
(b) Explain Fajan's rule. 3
6. (a) Give any three postulates of valence bond theory (Heitler-London approach). 3  
(b) Both CH<sub>4</sub> and H<sub>2</sub>O molecules undergo sp<sup>3</sup> hybridisation, but their shapes are different. Explain. 4
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