(b) (i) Explain electronegativity and electron gain enthalpy.

(ii) Explain the general characteristics of Ionic compounds.

(c) Draw Born Haber cycle of sodium chloride formation. Give the expression also. (4,5,6)

6. (a) Xenon difluoride is a linear molecule. But it has sp^3d hybridization. Why?

(b) Explain the different types of bonding that can be present in a chemical compound. Give an example of each.

(c) (i) What is meant by inert pair effect? Explain.

(ii) Predict the existence of H_2 on the basis of Molecular orbital theory. (4,5,6)

[This question paper contains 4 printed pages.]

Your Roll No. .....

Sr. No. of Question Paper : 1262

Unique Paper Code : 2172521202

Name of the Paper : DSC – Periodic Properties and Chemical Bonding

Name of the Course : **Bachelor of Science in Analytical / Industrial Chemistry / PSC**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** out of six questions.
3. Attempt all parts of question together.

1. (a) (i) Arrange C, N and O in the increasing order of their atomic radius and explain.

(ii) Which of the two NH_3 and NF_3 will have greater bond angle?

P.T.O.

(b) Why NaCl is soluble in water whereas AgCl is insoluble in water?

(c) Using VSEPR theory, explain the shapes and give the hybridization found in the following molecules: XeF_4, SF_6, H_2O. (4,5,6)

2. (a) (i) All the P-Cl bonds in $PC1_5$ are not equivalent. Explain?

(ii) Why Beryllium fluoride molecule is linear while sulphur fluoride is angular although both are triatomic?

(b) Using VSEPR theory, explain why the bond angle in water molecule is 104°27' and in ammonia 107°48'.

(c) Calculate the lattice energy of sodium chloride crystal from the following data by the use of Born-Haber cycle. Given: sublimation energy = 108.7 KJ/mol, dissociation energy = 225.9 KJ/mol, ionization energy of sodium = 489.5 KJ/mol, Electron gain enthalpy for chlorine = –351.4 KJ/mol, heat of formation of sodium chloride = –414.2 KJ/mol. (4,5,6)

3. (a) Define ionization energy. What are the factors affecting ionization energy?

(b) Why are the half-filled and completely filled subshells more stable? Explain it with an example.

(c) Draw the MO energy level diagram for carbon monoxide. (Coulson Method) (4,5,6)

4. (a) Calculate the lattice energy of sodium chloride when Madelung constant is 1.748, inter nuclear distance is 0.2814 nanometre and Born exponent is 9.

(b) What is mean by hydrogen bonding? Discuss the nature and consequences of hydrogen bonding. Out of o-nitrophenol and p-nitrophenol which has higher boiling point. Explain.

(c) Describe resonance. Draw and explain the resonating structure of CO_3^{2-}. (4,5,6)

5. (a) (i) Write short note on diagonal relationship.

(ii) Why do transition elements form complexes?

P.T.O.