

BACHELOR OF TECHNOLOGY (C.B.C.S.) (2021-COURSE)

B. Tech. Sem - II CHEMICAL :SUMMER- 2022

SUBJECT : INORGANIC CHEMISTRY

Day : Monday

Time : 10:00 AM-01:00 PM

Date : 1/8/2022

S-24053-2022

Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

**Q.1** a) Explain the hybridization of  $\text{BF}_3$  and  $\text{H}_2\text{O}$  molecule on the basis of Valence bond theory. (06)

b) Define Molecular Orbital Theory. (04)  
Give postulates of Molecular Orbital Theory.

**OR**

**Q.1** a) Explain the  $sp$  and  $sp^2$  hybridization using a suitable example. (05)

b) Draw the Molecular orbital energy level diagram of  $\text{N}_2$  molecule and find out its bond order. (05)

**Q.2** a) Define Polarization and polarization ability. (06)

Explain the important factors affecting the polarization of an ion.

b) Write note on Orbital concept implications for periodicity. (04)

**OR**

**Q.2** a) What is hybridization? (05)

Explain the steps involved in hybridization of atomic orbitals.

b) Draw the Lewis structure of  $\text{PCl}_5$  and  $\text{SF}_6$  molecule and explain the failure of Octet rule for both compounds. (05)

**Q.3** a) Write note on Alkali and Alkaline earth metals. (05)

b) Explain the position of s-block elements in the periodic table. (05)

**OR**

**Q.3** a) Write note on Halogens. (04)

b) Explain chemical reactions of Noble gases. (06)

Give properties of Group IA and IIB.

**Q.4** a) Draw the shapes of d orbitals and describe their orientations in space. (05)

b) Write note on Crystal field stabilization energy. (05)

**OR**

**Q.4** a) Explain the splitting of d orbitals in an Octahedral complex. (05)

b) Explain the filling of d electrons in  $t_{2g}$  and  $e_g$  orbitals in an Octahedral complex. (05)

**Q.5** a) Explain the hydrolysis of salts of weak acids and weak bases with examples. (05)

b) Define pH and pOH. Derive relation  $\text{pH} + \text{pOH} = 14$ . (05)

**OR**

**Q.5** a) Write note on: (06)

i) Common ion effect                      ii) Ionic product of water

b) Calculate the pH of                      i) 0.01M HCl                      ii) 0.01M NaOH (04)

**Q.6** a) Define Second order reaction. (06)

Write the differential rate law for the Second order reaction  $A \rightarrow \text{products}$ .  
Derive its integrated rate law.

b) Define Rate law and order with examples. (04)

**OR**

**Q.6** a) Discuss the Collision theory of bimolecular reactions. (05)

b) What are limitations of this theory? (05)

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