

PC 8651-MMH**AS/2057****INORGANIC CHEMISTRY—I**

(Common for B.Sc. Biotechnology)

Semester-II

Time Allowed : Three Hours]

[Maximum Marks : 26

Note :- The candidates are required to attempt *five* questions selecting *two* questions from each of Sections A & B. Section C is compulsory.

SECTION-A

1. (a) Define effective nuclear charge. Calculate the ENC for 3p electron in phosphorus atom. 2
- (b) Give reasons:—
 - (i) The 2nd electron affinity of oxygen is negative.
 - (ii) Second Ionisation energy of Na is higher than that of Mg. 2
2. (a) Explain:—
 - (i) Li forms normal oxide, Na the peroxide and K, Rb and Cs the superoxides.
 - (ii) LiF is insoluble in water whereas other alkali metal fluorides are soluble. 2
- (b) What are crown ethers and cryptates ? Write their unique characteristics. 9

3. (a) Why is diborane termed as an electron deficient compound ? Sketch its structure. What is unusual about bonding in this compound ? 2
- (b) What is back bonding ? Why does it occur in boron halide and not in aluminium halides ? 2
4. (a) Write two methods of preparation of alkyl lithium. Discuss its structure also. 2
- (b) (i) How electron affinity differs from electronegativity ?
- (ii) What is the role of alkali metal ions (Na^+ , K^+) in biological systems ? 2

SECTION-B

5. (a) What are Silanes ? How are they prepared ? Discuss their important characteristics. 2
- (b) Explain:
- (i) Why is CO_2 a gas and SiO_2 a giant molecule ?
- (ii) Does SiF_4 act as Lewis acid ? Give reason. 2
6. (a) Draw and discuss the structures of H_3PO_4 , H_3PO_3 and H_3PO_2 .
- (b) How does hydrazine react with :
- (i) AgNO_3 3
- (ii) HONO 1
7. (a) Complete the following reactions :
- (i) $\text{H}_2\text{SO}_4 + \text{SO}_2 \longrightarrow$
- (ii) $\text{Na}_2\text{S}_2\text{O}_3 + \text{dil H}_2\text{SO}_4 \longrightarrow$ 1
- (b) Nitric acid acts only as an oxidising agent while nitrous acid can act both as an oxidising agent and reducing agent. Why ? 1.5
- (c) Describe the bonding and structure of SO , both in gaseous and solid state. 1.5

8. (a) What are fluorocarbons ? Mention the industrially important fluorocarbons and their uses. 9
- (b) (i) Why are interhalogen compounds more reactive than halogens ? Explain with example.
- (ii) Which halogen has the highest electropositive character ? Explain. 2

SECTION-C(Compulsory)

9. (a) Calculate the electronegativity of carbon ($z = 6$) with covalent radius $r = 0.79 \text{ \AA}$ on the basis of Allred-Rochow Equation.
- (b) What is diagonal relationship ? Explain by taking an example of Be and Al.
- (c) Give two methods of preparation and structure of borazine.
- (d) What are fullerenes ? Explain structure of any one fullerene.
- (e) What are silicates ? Explain different types of silicates. 5x2=10