(b) Discuss the EAN rule and apply it to the following compounds : 12

(i) $Cr(CO)_6$

(ii) $Mn_2(CO)_{10}$

(iii) $Ni(CO)_4$

(iv) $Fe(CO)_5$

10. Explain the role of Na, K and Fe in the biological system. 20

11. What is Mossbauer spectroscopy ? Discuss its principle and applications. 20

12. Give two method for the preparation of Borazine. Discuss its chemical properties and structure. 20

 XE(H-3) — Ch (6)

2018

Time : 3 hours

Full Marks : 100

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

*Answer **five** questions selecting not more that **two** from any Group.*

Group – A

1. (a) Derive Schrodinger's wave equation and discuss its application to the hydrogen atom. 14

(b) What eigen functions and eigen values ? 6

2. (a) Draw the shapes of molecular orbitals obtained by the overlap of : 10

(i) Two s-orbitals

(ii) Two p-orbitals axially

(iii) Two p-orbitals non-axiallly

(b) What do you mean by bond-order ? Calculate the bond order of He_2^+, O_2 and N_2. 10

3. (a) What is mass defect ? How is it related to the binding energy and stability of nucleus ? 12

(b) Calculate the mass defect, binding energy and binding energy per nucleon of $_2He^4$ which has an isotopic mass = 4.0026 amu if m_p = 1.0081 and m_n = 1.0089. 8

4. Write short notes on any three of the following : 6+7+7 = 20

(a) Radius-ratio rule

(b) Radioactive series

(c) Chelates

(d) CFSE

(e) Normal and orthogonal wave functions

Group – B

5. (a) What are f-block elements ? Discuss the electronic Configurations and position of Lanthanides in the periodic table. 7

(b) What do you mean by lanthanide contraction ? Discuss its consequences. 8

(c) Explain the magnetic properties of lanthanides. 5

6. (a) What are the positions of Cr and Pt in the periodic table ? 6

(b) Discuss the chemistry of Cr with respect to the oxidation states exhibited and complex formation. 14

7. Discuss the preparation and important properties of : 20

(a) Hydrazine

(b) Hydroxylamine

(c) Hydrogen peroxide

8. (a) What are the positions of N, P, O, S and Te in the periodic table ? 10

(b) What are the name and structural formula of different oxy acids of P and S ? 10

Group – C

9. (a) What are metal Carbonyls and metal Nitrosyls ? Explain with examples. 8