

NOTE: Attempt FIVE Questions in All.

Q No. 1:

a) What is an electrode potential? How does it vary with concentration of ions in solution? Describe the calomel reference electrode and give the half cell reaction when it is coupled with a standard hydrogen electrode. (14 Marks)

b) Explain the following:-

(2+2+2 Marks)

- (i) Gamma radiations penetrate further into the human body than either alpha or beta radiation.
- (ii) A nucleus weighs less than the weights of neutrons and protons.
- (iii) In a nuclear explosion, a small mass has enormous destructive power.

Q No. 2:

a) State the First Law of Thermodynamics and write the mathematical expression for the law. Show thermodynamically that $C_p - C_v = R$

b) Write note on degeneracy and tunnel effect.

(15+5 Marks)

Q No. 3:

a) What is meant by isomerism? Discuss each of the following with suitable examples in relation to coordination compounds:- (4x4=16 Marks)

- (i) Ionization isomerism.
- (ii) Linkage isomerism.
- (iii) Geometrical isomerism.
- (iv) Optical isomerism.

b) Explain colour and oxidation states of transition elements.

(4 Marks)

Q No. 4:

a) Give the salient features of VSEPR Theory and discuss the shape of ICl_3 , XeF_4 , PCl_5 and $TiCl_4$ molecules with the help of this theory. (12 Marks)

b) Use Molecular Orbital Theory to predict the bond order and number of unpaired electrons in O_2^{2-} , O_2 , NO , CO . (8 Marks)

Q No. 5:

a) Describe briefly, but clearly, each of the following pollution problems:- (15 Marks)

- (i) Carbon monoxide pollution.
- (ii) Acid rain.
- (iii) Lead pollution.

b) What is mass defect and binding energy?

(5 Marks)

(02)

Q No. 6:

- a) With the help of flow sheet diagram describe manufacture sulphuric acid by contact process. Give a comparison of contact process and lead chamber process.
- b) Compare dry and wet processes for manufacture of cement.

(15+5 Marks)

Q No. 7:

- a) Derive Schrodinger wave equation for particle in one dimensional box and apply it to H-atom.
- b) What is corrosion? How is it prevented?

(15+5 Marks)