CHEMISTRY – I

Full Marks – 70

Pass Marks – 21

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *seven* questions.

1. (a) Fill in the blanks : $1 \times 5 = 5$

    (i) At STP 4·4g of CO_2 gas contains —— number of molecules.

    (ii) The conjugate acid of ammonia is ——.

    (iii) The magnetic quantum number gives the —— of orbitals.

    (iv) The outermost electron of transitional elements enters —— orbitals.

    (v) The basicity of hydroiodic acid is ——.

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(b) Give your answer in one word / sentence :

$1 \times 5 = 5$

(i) Give the electronic configuration of Al^{3+}.

(ii) What is Acidimetry ?

(iii) Define buffer solution.

(iv) Who has given the dual nature theory for electrons ?

(v) What is electro-chemical equivalent (e.c.e) ?

2. (a) Give the original statement of Charles's law. Show that $V \propto T$ at constant P. $2+3=5$

(b) With suitable example explain electronic concept of oxidation and reduction.   3

(c) Balance the following by ion-electron method :

2

$$Cr_2O_7^{2-} + H^+ \rightarrow Cr^{3+} + H_2O$$

3. (a) Classify salts with example.   4

(b) 1·325 gram of sodium carbonate neutralises 20 ml of sulphuric acid. Calculate the normality of the sulphuric acid.   4

(c) Give two examples of Lewis acid.   2

4. (a) Mention the success and drawbacks of Bohr's model of atom. 5

   (b) Explain Hund's rule of maximum multiplicity. 3

   (c) Name two molecules having hydrogen bonding. 2

5. (a) State and explain Le-Chatelier principle taking example of $2 SO_2 + O_2 = 2 SO_3$. 4

   (b) What is common-ion effect ? 3

   (c) Calculate the pH of 0.001 N HCl solution. 3

6. (a) Which compounds make water permanently hard ? 3

   (b) What is the difference between soft water and de-ionised water ? 3

   (c) Describe Permutit process for softening of hard water. 4

7. (a) State and explain Faraday's 2nd law of electrolysis. 4

   (b) How is electro-refining of metal done ? 4

   (c) What is galvanisation ? 2

8. (a) Give one example of each of the following :
Homogeneous catalysis, Heterogeneous catalysis, Negative catalyst and Catalyst promoter. 4

(b) Mention three important characteristics of transitional metals. 3

(c) The normality and molarity of a HCl solution is same. Explain. 3

9. Write short notes of : 2½×4=10

Pauli's exclusion principle, Quantum numbers, Cathod rays, Absolute zero temperature.