Exam. Code : 103205
Subject Code : 1351

B.A./B.Sc. 5th Semester
CHEMISTRY
(Physical Chemistry—B)

Time Allowed—3 Hours]   [Maximum Marks—35

Note :— Part—A : Attempt **all** the questions. Each question carries 1 mark.

Part—B : Attempt **SIX** questions in all, selecting **TWO** questions from each section. Each question carries **4.5** marks.

Log Tables may be asked for.

PART—A

Note :— **All** questions are compulsory.

1. Define equivalent conductance. How does it vary with dilution ?

2. What is liquid junction potential ? Give its significance.

3. What do you mean by buffer action ? Give its mechanism.

4. What is the cause of radioactivity ?

5. Differentiate between binding energy and bond energy.

6. What is meant by nuclear holocaust ?

7. Differentiate between combination bands and hot bands.

8. Why is methanol a good solvent for UV but not for IR Spectroscopy ?   8×1

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PART—B

Note :— Attempt **SIX** questions in all, selecting **TWO** questions from each section. Each question carries 4½ marks.

SECTION—I

9. Define and explain the following :

    (a) Specific conductance

    (b) Kohlrausch law

    (c) Ostwald dilution law

    (d) Transport numbers

    (e) Over-potential.   4.5

10. (a) How will you calculate various thermodynamic parameters i.e. ΔG, ΔH and K for a cell reaction ?

    (b) Describe moving boundary method for the determination of transport numbers.   2.5,2

11. (a) Describe various types of corrosion and suggest ways to prevent them.

    (b) How will find the pH of a solution by using glass electrode ?   3,1.5

SECTION—II

12. Tabulate the differences between the following :

    (a) Nuclear and chemical fuels

    (b) Nuclear fission and nuclear fusion

    (c) Alpha, Beta and Gamma radiations.   3×1.5

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13. (a) Give an account of nuclear forces.

(b) Calculate the binding energy of $_8O^{16}$ nucleus. Given masses of a proton, neutron and oxygen nucleus as 1.00782, 1.00867 and 15.99491 a.m.u. respectively.

3,1.5

14. Write notes on the following :

(a) Artificial Radioactivity

(b) Radiation Hazards

(c) Nuclear Reactor. 3×1.5

SECTION—III

15. (a) Outline the characteristic features of electromagnetic radiations.

(b) Describe rigid rotor model for rotational spectra.

(c) The spacing between lines in the rotational spectrum of HF is 42 cm⁻¹. Calculate the moment of inertia and bond length in HF. 3×1.5

16. (a) How do the Raman and IR Spectra of the same molecule resemble and differ ? Illustrate by taking suitable examples.

(b) Describe the various factors that influence the vibrational frequency of a particular group. 2.5,2

17. (a) Using a suitable energy diagram, illustrate the Franck-Condon principle in the vibronic spectra of diatomic molecules.

(b) Explain the effect of polar solvents on $n - \pi^*$ and $\pi - \pi^*$ transitions. 2.5,2

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