

Exam. Code : 103205  
Subject Code : 1351

B.A./B.Sc. 5<sup>th</sup> 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

**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.  $\Delta G$ ,  $\Delta H$  and  $K$  for a cell reaction ? 2.5,2
- (b) Describe moving boundary method for the determination of transport numbers.
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

13. (a) Give an account of nuclear forces.  
(b) Calculate the binding energy of  ${}_8\text{O}^{16}$  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.

$3 \times 1.5$

### 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  $42 \text{ cm}^{-1}$ . Calculate the moment of inertia and bond length in HF.

$3 \times 1.5$

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