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Exam. Code : 103205
Subject Code : 8054

B.A./B.Sc. 5th Semester (Old Syllabus 2017)

CHEMISTRY

Paper—Physical Chemistry–III

Time Allowed—3 Hours] [Maximum Marks—35

Note :— Log Tables may be asked for.

PART—A

Note :— **All** questions are compulsory. Each question carries **1** mark.

1. Define specific conductance. How does it vary with dilution ?
2. State Kohlrausch law. Mention its significance.
3. What is reference electrode ? Give one example.
4. Define pH and pKa.
5. Draw a conductivity curve for titration of HCl and NaOH.
6. What is buffer solution ? Give one example of buffer solution.
7. What is the cause of radioactivity ?
8. What is the significance of selection rules in spectroscopy ?

8×1=8

PART—B

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

SECTION—I

9. (a) Describe Arrhenius theory of electrolyte dissociation and mention its limitations.

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(b) How will you determine the solubility product of a sparingly soluble salt by conductivity measurements ? 2.5,2

10. (a) How will you determine pH of a solution by using hydrogen electrode ?

(b) 60 cc of silver nitrate solution contains 13.143 g of the salt. It was electrolysed using platinum electrodes. After electrolysis 60 cc of the anode solution was found to contain 12.553 g $AgNO_3$ and 1.259 g Ag deposited after passing electricity. Calculate transport numbers of Ag^+ and NO_3^- ions. 1.5,3

11. Write notes on the following :—

(a) Concentration cells.

(b) Corrosion

(c) Potentiometric titrations. 3×1.5

SECTION—II

12. Explain the difference between the following :—

(a) Thermal and nuclear reactions.

(b) Binding and bond energies.

(c) Nuclear fission and nuclear fusion. 3×1.5

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

(b) Enlist important applications of radioactivity. 3,1.5

14. Write notes on the following :—

(a) Artificial radioactivity.

(b) Nuclear forces

(c) Radioactive decay. 3×1.5

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SECTION—III

15. (a) Tabulate the difference between alpha, beta and gamma radiations.

(b) Give qualitative description of non-rigid rotor.

(c) The force constant of CO molecule is 1870 Nm^{-1}. Calculate the vibrational frequency in cm^{-1}.

3×1.5

16. (a) Taking a suitable example, explain P,Q and R branches in vibrational-rotational spectra.

(b) Describe the effect of anharmonic motion and isotope on the vibrational spectrum. 2.5,2

17. Explain the following :—

(a) Franck-Condon principle

(b) Born-Oppenheimer approximation

(c) Harmonic Oscillator. 3×1.5

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