



V Semester B.Sc. Examination, November/December 2018
(NS) (2013 – 14 and Onwards) (Semester Scheme)
(Repeaters) (Prior to 2016 – 17)
CHEMISTRY (Paper – VI)
Physical Chemistry

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) The question paper has **two** Parts. Answer **both** the Parts.
2) Draw diagrams and write chemical equations, **wherever** necessary.

PART – A

Answer **any eight** of the following questions. Each question carries **two** marks. (8×2=16)

1. Give any two advantages of conductometric titrations.
2. What are buffer solutions ? Give an example.
3. Mention any two limitations of standard hydrogen electrode.
4. A solution of an electrolyte having the resistance of 100 ohms is placed in a cell, the conductivity (specific conductance) of the solution is found to be 1.2 sm^{-1} . Calculate cell constant.
5. Write DHO equation and indicate the terms involved.
6. Write Nernst equation for single electrode potential and indicate the terms involved in it.
7. What is dipole moment ? Give its S.I. unit.
8. Give any two applications of Raman spectroscopy.
9. State Franck-Condon principle.
10. Define force constant and give its significance.
11. Differentiate fluorescence and phosphorescence.
12. State Beer-Lambert's law.

P.T.O.



PART - B

Answer **any nine** of the following questions. Each question carries **six** marks. (9×6=54)

13. a) What is molar conductance ? How do you determine molar conductance of an electrolyte using Wheatstone bridge circuit. (4+2)
b) Give any two limitations of Arrhenius theory. (4+2)
14. a) Describe the determination of pH of a solution using quinhydrone electrode. (4+2)
b) What are Galvanic cells ? Give an example. (4+2)
15. a) State Kohlrausch law of independent migration of ions. Give any two applications of the law. (4+2)
b) Define Ionic Mobility. (4+2)
16. a) What is transport number of an ions ? How is transport number of H⁺ ion determined by moving boundary method ? (4+2)
b) The molar conductance at infinite dilution for NaOH, NaCl and NH₄Cl are $24.81 \times 10^{-5} \text{ sm}^2 \text{ mol}^{-1}$, $12.6 \times 10^{-3} \text{ sm}^2 \text{ mol}^{-1}$ and $15 \times 10^{-3} \text{ sm}^2 \text{ mol}^{-1}$ respectively. Calculate the λ_{∞} of NH₄OH. (4+2)
17. a) How is emf of a cell determined experimentally by Poggendorff's compensation method ? (4+2)
b) What are the factors affecting single electrode potential ? (4+2)
18. a) What is meant by degree of hydrolyses of salt's ? Derive the relationship between Kh, Kw, Ka and Kb. (4+2)
b) Give any two analytical applications of buffer solution. (4+2)
19. a) Explain common ion effect and solubility product with an example. (4+2)
b) Write Clausius - Mossotti equation and indicate the trans involved. (4+2)
20. a) What are ferromagnetic and paramagnetic substances ? Mention their characteristics. (4+2)
b) What are polar and non-polar molecules ? Give an example for each. (4+2)

BMSCW

21. a) Sketch the number of modes of vibrations of CO_2 molecule, which of them is degenerate. (4+2)
b) Give any four differences between Stokes lines and anti-Stokes lines. (4+2)
22. a) Derive the relationship between internuclear distance and moment of inertia. (4+2)
b) What is zero-point energy ? (4+2)
23. a) Name the different types of molecular spectra, mention the region of the electromagnetic spectrum in which they appear. (4+2)
b) State Born-Oppenheimer approximation. (4+2)
24. a) State the laws of photochemistry. (4+2)
b) What is photosensitisation ? (4+2)
25. a) Give the selection rules for pure rotational and vibrational transitions. (2+4)
b) Write the difference between photophysical and photochemical processes with examples. (2+4)
-