(Pages : 3) D – 2522

Reg. No. : .....

Name : .....

Fifth Semester B.Sc. Degree Examination, December 2017
(First Degree Programme Under CBCSS)
Chemistry
Core Course
CH 1541 : PHYSICAL CHEMISTRY – I
(2013 Admission Onwards)

Time : 3 Hours Max. Marks : 80

All Saints' College Trivandrum

SECTION – A

Answer **all** questions. Answer in **one** word to maximum of **two** sentences. **Each** question carries **1** mark.

1. What is meant by Collision frequency ?
2. What are Miller indices ?
3. Define Molality.
4. What is meant by colligative property ?
5. Calculate the work of reversible expansion of 1 mole of ideal gas at 25°C from 10 L to 20 L.
6. Define chemical potential.
7. Give the Gibbs-Duhem equation and explain the terms.
8. What is meant by enthalpy of neutralization ?
9. What are point groups ?
10. Define centre of symmetry.

(10×1=10 Marks)

P.T.O.

SECTION – B

Answer **any eight** questions. Short answer type. **Each** question carries **2** marks.

11. Give the Maxwell-Boltzmann law of distribution of molecular velocities and explain the terms.
12. State the virial equation of state and explain the terms involved.
13. Sketch the (220) planes of a face centered cubic lattice.
14. Distinguish between Schottky and Frenkel defect.
15. What will be the nature of the value for van't Hoff factors when a solute undergoes association and dissociation in solution ?
16. How is molar refraction of a liquid related to its refractive index and density ?
17. List the symmetry elements of BF_3 molecule.
18. What are the applications of liquid crystals ?
19. Distinguish between the terms isothermal process and adiabatic process.
20. What is entropy ? Give its physical significance.
21. Using Carnot's cycle derive an expression for the efficiency of heat engine.
22. Give the Gibbs-Helmholtz equation and explain the terms. **(8×2=16 Marks)**

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SECTION – C

Answer **any six** questions. Short essay type. **Each** question carries **4** marks.

23. Discuss the effect of temperature on the distribution of molecular velocities.
24. Derive Bragg's equation and explain its applications.
25. Show that Cp – Cv = R for 1 mole of an ideal gas.
26. Describe with theory the Capillary rise method of determining surface tension of a liquid.

27. Determine the point group of NH_3.

28. Discuss the criteria of equilibrium and spontaneity.

29. What is meant by the term fugacity ? How can it be determined ?

30. How are the liquid crystals classified ? Explain the structural features of each class.

31. Calculate the entropy change produced when 5 moles of an ideal gas expand reversibly from a volume 120 dm^3 at 300 K to a volume of 150 dm^3 at 400 K. (C_v = 1.5 R).

(6×4=24 Marks)

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SECTION – D

Answer **any two** questions. Long essay type. **Each** question carries **15** marks.

32. a) Discuss the powder method for the X-ray diffraction studies of crystals.

    b) Explain the determination of structure of NaCl from the diffraction pattern.

33. Discuss the methods used for the determination of critical constants of a gas.

34. Derive the expression for Joule Thomson coefficient. Obtain the relation between Joule Thomson coefficient and inversion temperature.

35. a) Derive the relation $\Delta T_b = K_b \times m$.

    b) Explain any two methods for the determination of molecular mass of solutes.

(2×15=30 Marks)