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

### 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)

## 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)**

## 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 $C_p – C_v = R$ 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)**

## 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)**

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