

Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2021**

**First Degree Programme under CBCSS**

**Core Course**

**CH 1541 : PHYSICAL CHEMISTRY – I**

**(2018 and 2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. one word type. **Each** question carries **1** mark.

1. What is the average distance travelled by a molecule between two successive collision is called?
2. What is the value of compressibility factor for an ideal gas?
3. Name the temperature at which second virial coefficient vanishes.
4. What is the relationship between inversion temperature and Van-der Waals constants?
5. What is the Bravais lattice of KCl called?
6. What is the SI unit of coefficient of viscosity?
7. What are Isotonic solutions?
8. Which concept is introduced by Zeroth law of thermodynamics?

9. Which type of thermodynamic property is the density of a substance?
10. What is the point group of Trans-butadiene?

(10 × 1 = 10 Marks)

SECTION – B

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

11. Define Van't Hoff's factor.
12. Write down the expression for interplanar spacing ( $d_{hkl}$ ) of a cubic unit cell.
13. Explain compressibility factor.
14. Explain the different symmetry elements in crystals.
15. Define Joule-Thomson effect.
16. Depression in freezing point of water observed for the same amount of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order given above. Explain.
17. What is chemical potential?
18. Explain why the addition of a non-volatile solute increases the boiling point of a liquid?
19. What is the relationship between  $q_p$  and  $q_v$ ?
20. Define efficiency of heat engine.
21. State the second law of thermodynamics in terms of entropy.
22. List out the symmetry elements of the  $C_{2h}$  point group.
23. Define Graham's law of diffusion.
24. Sketch the Bravais lattices for cubic unit cell.

25. What is molal elevation constant?

26. What is fugacity?

(8 × 2 = 16 Marks)

SECTION – C

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

27. Explain Frenkel and Schottky defects in crystals.

28. What are Miller indices? Explain the process for determining them using suitable example.

29. A metallic element exist as a cubic unit cell with  $a = 2.85 \text{ \AA}$ ,  $d = 7.20 \text{ gm/cm}^3$ . How many unit cells will be present in 100 gm of the metal?

30. Briefly explain reverse osmosis.

31. Explain the determination of viscosity using the Ostwald viscometer.

32. Show that  $C_p - C_v = R$  for one mole of an ideal gas.

33. Derive the Gibbs Helmholtz relation and its significance.

34. Obtain an expression for entropy change in the Isothermal reversible expansion of an ideal gas.

35. Explain the Hesse's law of constant heat summation and its application.

36. Explain the different types of semiconductors and their uses.

37. Explain the different types of liquid crystals with examples.

38. Construct the group multiplication table for  $C_{2v}$  point group.

(6 × 4 = 24 Marks)