

Reg. No .....

Name .....

26U644

**B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2026**

**SEMESTER 6 : CHEMISTRY**

**COURSE : 19U6CRCHE11 : PHYSICAL CHEMISTRY – III**

*(For Regular 2023 Admission and Supplementary 2022/2021/2020 /2019 Admissions)*

Time : Three Hours

Max. Marks: 60

**PART A**

**Answer All (1 mark each)**

1. Write two examples for AX<sub>2</sub> type ionic compounds?
2. What is the contribution of one vibrational mode to the total energy of one gas molecule?
3. The point group of water is -----.
4. The density of water is maximum at \_\_\_\_\_ temperature.
5. Give an example for chemisorption.
6. Which is the point group for a linear molecule with an inversion centre?
7. Define Weiss indices.
8. What is the reason for pressure of a gas?

**(1 x 8 = 8)**

**PART B**

**Answer any 6 (2 marks each)**

9. How will surface tension vary with temperature?
10. Give virial equation of state and explain its significance.
11. Give the point group and symmetry elements present in BF<sub>3</sub>.
12. Show that C<sub>p</sub> = 2.5 R for 1 mole of an ideal gas.
13. Why is all adsorptions exothermic in nature?
14. Explain the effect of temperature on adsorption.
15. Differentiate between crystalline and amorphous solids.
16. What is cholesteric liquid crystal?

**(2 x 6 = 12)**

**PART C**

**Answer any 4 (5 marks each)**

17. What is a point group? Give the conditions for a point group.
18. State law of equipartition of energy and apply it to obtain the expressions for total energy per mole for a non-linear molecule.
19. Explain why: a) liquid drop is spherical in shape, b) Glycerol is more viscous than water.
20. X-rays of wavelength 154 Å are diffracted at an angle of 20° for the second order in Bragg's spectrometer. Find the distance between the planes.
21. Describe collision frequency and discuss the effect of temperature and pressure on collision frequency.
22. Explain the crystal structure of ZnS with suitable schematic representation.

**(5 x 4 = 20)**

**PART D**

**Answer any 2 (10 marks each)**

23. a) Brief Laue method, powder method and rotating crystal method with schematic representations.  
b) The first order reflection from 100 plane of a cubic crystal with  $d_{100}$  of  $4.5 \text{ \AA}$  occurs with a glancing angle of  $19.0^\circ$ . Calculate the wavelength of the X-rays used.
24. Derive van der Waal's equation of state and apply it to explain the real gas behaviour at different T and P conditions.
25. Write a note on Langmiur and BET adsorption isotherms.
26. a) Explain how liquid state is different from solid and gaseous states.  
b) Describe the abnormal behaviour of water.

**(10 x 2 = 20)**