C 43160 (Pages : 2) Name.....

Reg. No.....

SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2023

Chemistry

CHE 2C 02—PHYSICAL CHEMISTRY

(2019—2022 Admissions)

Time : Two Hours Maximum : 60 Marks

Section A (Short Answers)

Answer questions up to 20 *marks.*

Each question carries 2 *marks.*

1. State first law of thermodynamics and give its mathematical expression.
2. What is a spontaneous process ? Mention the criteria for spontaneity in terms of free energy.
3. Define surface tension ? What is the effect of temperature on surface tension of a liquid.
4. What are colligative properties ? Give one example.
5. Define specific conductance of an electrolyte solution. Explain the variation of specific conductance with dilution.
6. Give any *four* advantages of conductometric titrations.
7. Write down Bragg's equation and explain the terms involved.
8. What is meant by electrode potential? What is the value of electrode potential for Standard Hydrogen electrode ?
9. How does temperature and pressure influence the solubility of gases in liquids ?
10. Write any four postulates of kinetic molecular theory of gases.
11. If the pressure and temperature of 6 litres of a gas is doubled, what would be its volume ?
12. Define RMS velocity and give its mathematical expression derived from Maxwell equation.

[Ceiling of marks : 20]

Turn over

Section B (Paragraph)

Answer questions up to 30 *marks.*
Each question carries 5 *marks.*

13. What are fuel cells ? Describe the functioning of $H_2 - O_2$ fuel cell.

14. (a) Account for the entropy change of the universe for a reversible process with suitable explanation.

    (b) Calculate the entropy change in melting of 1 Kg of ice at 25°C. Heat of fusion of ice is 334.72 Jg^{-1}.

15. Briefly explain the principle of conductometric titration with reference to weak acid-strong base titration.

16. Explain Maxwell distribution of molecular velocities using suitable diagram.

17. What are miller indices? Determine the miller indices for a plane when the intercepts along the axis are : (i) 2a, 3b and 2c ; and (ii) 1a, 2b and 3c.

18. Explain the determination of molecular mass using any one of the colligative properties.

19. Write a short note on non-stoichiometric defects in crystals.

[Ceiling of marks : 30]

Section C (Essay)

Answer any **one** *question.*
The question carries 10 *marks.*

20. (a) Describe buffer solutions with an example each for acidic and basic buffer. Explain the buffer action of acetic acid/sodium acetate buffer.

(5 marks)

    (b) State Kohlrausch's law and explain any two applications of the law. (5 marks)

21. (a) Write a short note on various symmetry elements in crystals. (5 marks)

    (b) Write down the van der Waals equation and explain the terms. Give a detailed account for the deviation of real gases from ideal behaviour.

(5 marks)

[1 × 10 = 10 marks]