(6 pages) **Reg. No. :** .....

Code No. : 20401 E **Sub. Code : CMCH 31**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2022.

Third Semester

Chemistry — Core

PHYSICAL CHEMISTRY — I

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The relation for root mean square velocity is

(a) $\frac{\sqrt{8RI}}{\pi m}$ (b) $\sqrt{\frac{3RT}{m}}$

(c) $\frac{\sqrt{2RI}}{m}$ (d) None of these

2. The number of vibrational modes of CO_2 and H_2O molecules are

(a) 4, 3 (b) 2, 2

(c) 3, 2 (d) 2, 4

3. For an ideal solution

(a) $\Delta H_{mix} = 0$ (b) $\Delta H_{mix} < 0$

(c) $\Delta H_{mix} > 0$ (d) None of these

4. Addition of small amount of NaCl to phenol water system

(a) Increases the CST

(b) Decreases the CST

(c) Does not alter the CST

(d) Increases the freezing point of the mixture

5. Each Na^+ ion in NaCl lattice is surrounded by

(a) 1 Cl^{-1}ion (b) 8 Cl^{-1}ion

(c) 4 Cl^{-1}ion (d) 6 Cl^{-1}ion

6. Bragg's equation is

(a) $n\lambda = 2d\sin\theta$ (b) $n\lambda = d\sin\theta$

(c) $n\lambda = 2d\cos\theta$ (d) $n\lambda = d\cos\theta$

7. In nuclear reactors, heavy water is used as

(a) projectile (b) fuel

(c) moderator (d) coolant

8. Fuel used in nuclear reactor is

(a) thorium (b) sodium

(c) uranium (d) petroleum

9. Emission of light as a result of a chemical reaction is called

(a) phosphorescence

(b) chemiluminescence

(c) thermoluminescence

(d) fluorescence

10. The energy associated with a photon is given by

(a) $E = h\lambda$ (b) $E = h\gamma$

(c) $E = hc$ (d) $E = hc^2$

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write the postulates of the kinetic theory of gases.

Or

(b) Derive the relation between C_{rms}, C_{av}, C_{mp}.

12. (a) Explain static method of measurement of vapour pressure.

Or

(b) State Raoult's law of ideal solutions, Explain azeotropic distillation.

13. (a) Explain Schottky and Frenkel defects in crystals and their consequences.

Or

(b) Explain conductors, insulators, semiconductors.

14. (a) Write briefly the gaseous diffusion method for separation of isotopes.

Or

(b) Write the applications of ratio isotopes.

15. (a) State Beer - Lambert law and Grothus - Draper law and explain.

Or

(b) Explain photosensitization and its importance.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Write notes on :

(i) Collision number

(ii) Collision diameter

(iii) Mean free path

(iv) Maxwell's law of distribution of molecular velocities.

Or

(b) Explain the types and origin of Vanderwaal's forces.

17. (a) Derive Duhem - Marqule's equation.

Or

(b) What is CST? Discuss the phenol - water system.

18. (a) Write the differences between crystalline solids and amorphous solids.

Or

(b) Derive Bragg's equation.

19. (a) Explain Geiger - Muller counter.

Or

(b) Explain power and breeder reactors.

20. (a) Explain the method of determination of quantum yield.

Or

(b) What is phosphorescence? Explain it.

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