

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

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 × 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}
- .

2. The number of vibrational modes of CO
- ₂
- and H
- ₂
- O 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⁻ ion (b) 8 Cl⁻ ion
 (c) 4 Cl⁻ ion (d) 6 Cl⁻ 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) $n\lambda = d \cos \theta$

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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.

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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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