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Reg. No. :

Code No. : 30476 E Sub. Code : CMCH 31

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

Third Semester

Chemistry — Core

PHYSICAL CHEMISTRY — I

(For those who joined in July 2021-2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The relation for the most probable velocity is.

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

(c) $\sqrt{\frac{3RT}{m}}$ (d) $\sqrt{\frac{2RT}{m}}$

2. The number of vibrational modes of CO₂ and H₂O molecule are

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

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

3. For an Ideal solution

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

(c) $\Delta H_{\text{mix}} < 0$ (d) none of these

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

(a) Increase the CST

(b) Decrease the CST

(c) Does not alter the CST

(d) Increases the freezing point of the mixture

5. Which of the following has the ECC structure?

(a) KCl (b) NaCl

(c) LiCl (d) CsCl

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

- (a) 1Cl^- ion (b) 8Cl^- ion
(c) 4Cl^- ion (d) 6Cl^- ion

7. The isotopes used in hydrogen bomb are

- (a) ${}_1\text{H}^1, {}_1\text{D}^2$ (b) ${}_1\text{H}^1, {}_1\text{T}^3$
(c) ${}_1\text{H}^1, {}_2\text{He}^3$ (d) ${}_1\text{D}^2, {}_1\text{T}^3$

8. Which of the following isotopes used as medicine

- (a) Cobalt-60 (b) Phosphorous 32
(c) Iodine-131 (d) All the above

9. The energy associated with a photon is given by

- (a) $E = h\lambda$ (b) $E = h\nu$
(c) $E = hc$ (d) $E = hc^2$

10. The light emitted in a chemical reaction is

- (a) Cold light (b) Hot light
(c) Bright light (d) None of these

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 kinetic theory of gases.

Or

(b) Explain collision frequency, collision diameter collision number.

12. (a) Explain azeotropic distillation.

Or

(b) Explain dynamic method of measurement of vapour pressure.

13. (a) Explain schottky and frenkel defects in crystals and their consequences.

Or

(b) Write and explain Born – Lande equations.

14. (a) Write the differences between natural radioactivity and artificial radioactivity.

Or

(b) Explain power reactor.

15. (a) Explain Beer – Lambert's and Grothus draper laws.

Or

- (b) Briefly 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) Explain Maxwell's law of distribution of molecular velocities and its significance.

Or

- (b) Explain molecular velocities and write the relation between them.

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

Or

- (b) Discuss phenol – water system.

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

Or

- (b) Derive Bragg's equation.

19. (a) Explain any one method of separation of isotopes.

Or

- (b) Write the differences between nuclear fission and nuclear fusion.

20. (a) Explain the kinetics and mechanism of photochemical combination of H_2 and Cl_2 .

Or

- (b) Write notes on :

(i) Chemiluminescence

(ii) Fluorescence.
