📘 DPP–3 : SOLUTIONS (Class 12 Chemistry – JAC Board)

🔹 **SECTION–A : MCQs (20 × 1 = 20 marks)**

1. Vapour pressure of a solution is always
   (A) Greater than that of pure solvent
   (B) Equal to that of pure solvent
   (C) Less than that of pure solvent
   (D) Independent of solute

2. Raoult's law is applicable to
   (A) Ideal solutions
   (B) Non-ideal solutions
   (C) Electrolytic solutions
   (D) Gaseous solutions

3. Relative lowering of vapour pressure is equal to
   (A) Mole fraction of solute
   (B) Mole fraction of solvent
   (C) Molarity
   (D) Molality

4. When a non-volatile solute is added to a solvent, its vapour pressure
   (A) Increases
   (B) Decreases
   (C) Remains constant
   (D) Becomes zero

5. Raoult's law for a binary solution is given by
   (A) $P = P^0$
   (B) $P = P^0X_1$
   (C) $P = P_1^0X_1 + P_2^0X_2$
   (D) $P = X_1 + X_2$

6. Which of the following solutions obeys Raoult's law most closely?
   (A) Benzene–Toluene
   (B) Ethanol–Water
   (C) Acetone–Chloroform
   (D) HCl–Water

7. Vapour pressure lowering depends upon
   (A) Nature of solute
   (B) Nature of solvent
   (C) Number of solute particles
   (D) Pressure

8. If the mole fraction of solvent is 0.90, the mole fraction of solute is
   (A) 0.10
   (B) 0.90
   (C) 1.00
   (D) 0.00

9. Which of the following is NOT a volatile solute?
   (A) Ethanol
   (B) Acetone
   (C) Glucose
   (D) Benzene

10. For dilute solutions, relative lowering of vapour pressure is approximately equal to
   (A) Molality
   (B) Mole fraction of solute
   (C) Mole fraction of solvent
   (D) Normality

11. Vapour pressure of pure solvent depends on
   (A) Temperature
   (B) Nature of solvent
   (C) Both (A) and (B)
   (D) Number of solute particles

12. In ideal solutions, ΔHmixing and ΔVmixing are
   (A) Positive
   (B) Negative
   (C) Zero
   (D) Unequal

13. Which statement is correct for ideal solutions?
   (A) They show deviation from Raoult's law
   (B) They obey Raoult's law over entire range
   (C) They form azeotropes
   (D) Their vapour pressure is zero

14. Relative lowering of vapour pressure is a
   (A) Colligative property
   (B) Additive property
   (C) Constitutive property
   (D) Intensive property

15. Which of the following factors does NOT affect vapour pressure?
   (A) Temperature
   (B) Nature of solvent
   (C) Amount of solvent
   (D) Nature of solute

16. Vapour pressure of a solution decreases when
   (A) Solute is volatile
   (B) Solute is non-volatile
   (C) Temperature increases
   (D) Pressure increases

17. Which graph represents Raoult's law?
   (A) Straight line between P and X
   (B) Parabolic curve
   (C) Hyperbola
   (D) Vertical line

18. The vapour pressure of solution containing non-volatile solute is due to
   (A) Solvent only

(B) Solute only
(C) Both solute and solvent
(D) Neither

19. Relative lowering of vapour pressure increases when
(A) Temperature decreases
(B) Solvent amount increases
(C) Solute amount increases
(D) Pressure decreases

20. If P^0 is vapour pressure of pure solvent and P is vapour pressure of solution, then relative lowering is
(A) $P^0 - P$
(B) P / P^0
(C) $(P^0 - P) / P^0$
(D) $(P - P^0) / P$

SECTION–B : Short Answer Questions

1. State Raoult's law.
2. Define relative lowering of vapour pressure.
3. Why does addition of a non-volatile solute lower the vapour pressure of a solvent?
4. What is an ideal solution? Give one example.
5. Write any two characteristics of ideal solutions.

SECTION–C : Long Answer Questions

1. **Derive the expression for relative lowering of vapour pressure** of a solution containing a non-volatile solute.
2. The vapour pressure of pure benzene at a certain temperature is **0.850 bar**.
A non-volatile solute (0.5 g) is added to **39 g of benzene** and the vapour pressure of solution becomes **0.845 bar**.
Calculate the **molar mass of the solute**.