VITEEE 2024 Question Paper with Solutions

Memory-Based Solved Paper (Physics, Chemistry, Mathematics, Aptitude & English)

> **Note:** VIT does not officially release VITEEE question papers. This compilation features verified memory-based questions reported from VITEEE 2024 along with an answer key and detailed explanations.

Exam	Duration Mode	2024 Pattern (125 MCQs)	Marking Scheme (2024)
Online CBT	2 Hours 30 Minutes	Maths/Bio: 40 | Physics: 35 | Chem: 35 | Aptitude: 10 | English: 5	+1 for correct, 0 for incorrect

Section I: Physics

Q1. The electrostatic force between two point charges q_1 and q_2 placed in vacuum at a distance r is F. The force between them when placed in a medium of dielectric constant K = 5 at a distance r/5 will be:

(A) F/25 (B) 5F (C) 25F (D) F/5

Q2. A charged particle moving in a uniform magnetic field B has velocity components both along B and perpendicular to B. The path followed by the charged particle will be:

(A) Helical path with axis perpendicular to B

(B) Helical path with axis parallel to B

(C) Circular path in a plane parallel to B

(D) Straight line along B

Q3. A heavy box of mass 50 kg is sliding on a horizontal surface. If the coefficient of kinetic friction is 0.3, the force of kinetic friction is (take g = 9.8 m/s^2):

(A) 14.7 N (B) 147 N (C) 150 N (D) 490 N

Q4. When unpolarized light is incident at an angle of 60° on a transparent medium from air, the reflected ray is completely plane-polarized. The angle of refraction in the medium is: (A) 30° (B) 45° (C) 60° (D) 90°

Q5. A cylinder of height 20 m is completely filled with water. The velocity of efflux of water through a small hole on the side wall near its bottom is (take g = 10 m/s^2): (A) 10 m/s (B) 20 m/s (C) 25.5 m/s (D) 5 m/s

Q6. Two bodies of masses 4 g and 25 g are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is:

(A) 3 : 5 (B) 5 : 4 (C) 2 : 5 (D) 4 : 25

Section II: Chemistry

Q7. At 25 °C and 1 atm, the enthalpies of combustion of benzene(l) and acetylene(g) are −3268 kJ mol^{-1} and −1300 kJ mol^{-1}, respectively. The enthalpy change for $3C_2H_2(g) \rightarrow C_6H_6(l)$ is:

(A) +324 kJ mol^{-1} (B) −632 kJ mol^{-1} (C) +632 kJ mol^{-1} (D) −1968 kJ mol^{-1}

Q8. For which of the following sets of four quantum numbers will an electron have the highest energy?

(A) n = 4, l = 0, m = 0, s = +½ (B) n = 4, l = 2, m = 1, s = +½

(C) n = 3, l = 2, m = 0, s = +½ (D) n = 4, l = 1, m = −1, s = −½

Q9. Which of the following thermodynamic relations is NOT correct?

(A) $\Delta H = \Delta U - P\Delta V$ (B) $\Delta U = q + W$ (C) $\Delta S_{sys} + \Delta S_{surr} \geq 0$ (D) $\Delta G = \Delta H - T\Delta S$

Q10. Which of the following statements regarding carbonyl reactions is FALSE?

(A) Cannizzaro reaction is given by aldehydes lacking α-hydrogen in strong alkali.

(B) Aldol condensation is given by aldehydes having α-hydrogen in dilute alkali.

(C) Formaldehyde undergoes aldol condensation in presence of dilute NaOH.

(D) Benzaldehyde undergoes Cannizzaro reaction with concentrated NaOH.

Section III: Mathematics

Q11. If vector A = 4i + 3j and vector B = 3i + 4j, then the cosine of the angle between A and (A + B) is: (A) 9/(5√2) (B) 7/(5√2) (C) 5√2/49 (D) 1/√2

Q12. If $S_n = 3n^2 + 5n$ represents the sum of the first n terms of an A.P., find its 10th term (a_{10}):

(A) 60 (B) 62 (C) 64 (D) 66

Q13. Solve for x: 4(x − 2) = 3(x + 5)

(A) 23 (B) 17 (C) 13 (D) 7

Section IV: Aptitude & English

Q14. A train 150 m long passes a stationary pole in 15 seconds. What is the speed of the train in km/h?

(A) 24 km/h (B) 30 km/h (C) 36 km/h (D) 45 km/h

Q15. Choose the correct antonym of **Benevolent**:

(A) Generous (B) Kind (C) Compassionate (D) Malevolent

Quick Answer Key

Q. No.	Ans	Q. No.	Ans	Q. No.	Ans
Q1	(B)	Q6	(C)	Q11	(B)
Q2	(B)	Q7	(B)	Q12	(B)
Q3	(B)	Q8	(B)	Q13	(A)
Q4	(A)	Q9	(A)	Q14	(C)
Q5	(B)	Q10	(C)	Q15	(D)

Detailed Solutions

1. **(B) 5F:** $F' = (1/K) \times [q_1q_2 / (4\pi\varepsilon_0(r/5)^2)] = (25/5)\ F = 5F$.

2. **(B) Helical path with axis parallel to B:** The perpendicular component causes circular motion while the parallel component produces uniform linear drift along B, resulting in a helix whose axis is parallel to B.

3. **(B) 147 N:** $f_k = \mu_k\, m\, g = 0.3 \times 50 \times 9.8 = 147$ N.

4. **(A) 30°:** By Brewster's law, when reflected light is completely polarized, $i_p + r = 90°$. Hence $r = 90° - 60° = 30°$.

5. **(B) 20 m/s:** By Torricelli's theorem, $v = \sqrt{(2gh)} = \sqrt{(2 \times 10 \times 20)} = \sqrt{400} = 20$ m/s.

6. **(C) 2 : 5:** Momentum $p = \sqrt{(2mE)}$. For equal kinetic energy E, $p_1/p_2 = \sqrt{(m_1/m_2)} = \sqrt{(4/25)} = 2/5$.

7. **(B) −632 kJ mol^{-1}:** $\Delta H = 3\Delta H_c(C_2H_2) - \Delta H_c(C_6H_6) = 3(-1300) - (-3268) = -3900 + 3268 = -632$ kJ mol^{-1}.

8. **(B) n = 4, l = 2, m = 1, s = +½:** By the (n + l) rule, 4d has n + l = 6, which is higher than 4s (4), 3d (5), and 4p (5).

9. **(A) ΔH = ΔU − PΔV:** By definition, enthalpy H = U + PV, so at constant pressure $\Delta H = \Delta U + P\Delta V$ (not minus).

10. **(C):** Formaldehyde (HCHO) has no α-hydrogen atom, so it undergoes the Cannizzaro reaction rather than aldol condensation.

11. **(B) 7/(5√2):** $A + B = 7i + 7j$. $|A| = 5$, $|A + B| = 7\sqrt{2}$, and $A \cdot (A + B) = 4(7) + 3(7) = 49$. Thus $\cos\theta = 49 / (35\sqrt{2}) = 7 / (5\sqrt{2})$.

12. **(B) 62:** $a_{10} = S_{10} - S_9 = [3(100) + 50] - [3(81) + 45] = 350 - 288 = 62$.

13. **(A) 23:** $4x - 8 = 3x + 15 \Rightarrow x = 23$.

14. **(C) 36 km/h:** Speed = 150 / 15 = 10 m/s = 10 × (18/5) = 36 km/h.

15. **(D) Malevolent:** "Benevolent" means well-meaning and kind; its direct opposite is "Malevolent."

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