



General Instructions

- (i) **Duration:** The total duration of the examination is 2.5 hours (150 minutes).
- (ii) **Total Marks:** The complete paper carries a maximum of 500 marks.
- (iii) **Structure:** The paper has 4 Sections:
 - **Part 1:** 35 Multiple Choice Questions (Physics).
 - **Part 2:** 35 Multiple Choice Questions (Chemistry).
 - **Part 3:** 40 Multiple Choice Questions (Mathematics/Biology).
 - **Part 4:** 10 Multiple Choice Questions (Aptitude).
 - **Part 4:** 5 Multiple Choice Questions (English)
- (iv) **Compulsory Questions:** All 125 questions are compulsory.
- (v) Each question has four options. Only **one** option is correct.
- (vi) **Correct Answer:** +4 marks.
- (vii) **Incorrect Answer:** -1 (Negative marking).
- (viii) **Unanswered/Marked for Review:** 0 marks.

1. Find the distance between the planes $2x + 3y + 4z = 4$ and $4x + 6y + 8z = 12$.

- (A) $\frac{1}{\sqrt{29}}$
- (B) $\frac{2}{\sqrt{29}}$
- (C) $\frac{3}{\sqrt{29}}$

(D) $\frac{4}{\sqrt{29}}$

2. If A is a square matrix of order 3 and $|A| = 5$, find $|adj(A)|$.

- (A) 5
(B) 10
(C) 25
(D) 125
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3. Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$.

- (A) $\frac{\pi}{2}$
(B) $\frac{\pi}{3}$
(C) $\frac{\pi}{4}$
(D) $\frac{\pi}{6}$
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4. What is the ratio of the de Broglie wavelengths of an electron and a proton moving with the same velocity?

- (A) $\frac{m_e}{m_p}$
(B) $\frac{m_p}{m_e}$
(C) 1
(D) $\sqrt{\frac{m_p}{m_e}}$
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5. A capacitor of $10 \mu F$ is charged to $100V$. Find the energy stored in it.

- (A) $0.5 J$
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- (B) $0.05 J$
 - (C) $5 J$
 - (D) $0.005 J$
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6. If the current in a coil changes from $2A$ to $4A$ in $0.1 s$, inducing an EMF of $20V$, find the self-inductance.

- (A) $0.5 H$
 - (B) $1 H$
 - (C) $2 H$
 - (D) $4 H$
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7. Which of the following is the most acidic: Ethanol, Phenol, or *o*-Nitrophenol?

- (A) Ethanol
 - (B) Phenol
 - (C) *o*-Nitrophenol
 - (D) All have same acidity
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8. What is the product of the reaction between Benzene and CH_3Cl in the presence of anhydrous $AlCl_3$?

- (A) Toluene
 - (B) Phenol
 - (C) Chlorobenzene
 - (D) Benzaldehyde
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9. What is the oxidation state of Nickel in $Ni(CO)_4$?

- (A) +2
 - (B) +1
 - (C) 0
 - (D) -2
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10. Find the missing number: 2, 6, 12, 20, 30, ?

- (A) 38
 - (B) 40
 - (C) 42
 - (D) 44
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11. Pointing to a photograph, a man says, "I have no brother or sister, but that man's father is my father's son." Who is in the photo?

- (A) His father
 - (B) His son
 - (C) His nephew
 - (D) Himself
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12. Choose the correct synonym for "Diligent."

- (A) Lazy
 - (B) Careless
 - (C) Hardworking
 - (D) Ignorant
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