



General Instructions

- (i) **Duration:** The total duration of the examination is 3 hours (180 minutes).
- (ii) **Total Marks:** The complete paper carries a maximum of 200 marks.
- (iii) **Structure:** The paper has 3 Sections:
 - **Section A:** 50 Multiple Choice Questions (Physics).
 - **Section B:** 50 Multiple Choice Questions (Chemistry).
 - **Section B:** 50 Multiple Choice Questions (Mathematics).
- (iv) **Compulsory Questions:** All 150 questions are compulsory.
- (v) Each question has four options. Only **one** option is correct.
- (vi) **Correct Answer:** +1 marks.
- (vii) **Incorrect Answer:** (No Negative marking).
- (viii) **Unanswered/Marked for Review:** 0 marks.

1. If $\cos 4x = \cos 3x$, find the general solution for x .

- (A) $x = 2n\pi$ or $x = \frac{2n\pi}{7}$, where $n \in \mathbb{Z}$
- (B) $x = n\pi$ or $x = \frac{n\pi}{7}$, where $n \in \mathbb{Z}$
- (C) $x = \frac{2n\pi}{7}$ only
- (D) $x = 2n\pi$ only

2. Evaluate the integral: $\int \frac{\sin x}{\sin 4x} dx$

(A) $-\frac{1}{8} \log \left| \frac{1+\sin x}{1-\sin x} \right| + \frac{1}{4\sqrt{2}} \log \left| \frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x} \right| + C$

(B) $\frac{1}{8} \log \left| \frac{1+\sin x}{1-\sin x} \right| - \frac{1}{4\sqrt{2}} \log \left| \frac{1+\sqrt{2}\sin x}{1-\sqrt{2}\sin x} \right| + C$

(C) $-\frac{1}{8} \log \left| \frac{1+\sin x}{1-\sin x} \right| + \frac{1}{4\sqrt{2}} \log \left| \frac{1-\sqrt{2}\sin x}{1+\sqrt{2}\sin x} \right| + C$

(D) None of these

3. Find the eigenvalues of the matrix $A = \begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$.

(A) 0, 1, 1

(B) 0, -1, -1

(C) 1, -1, 0

(D) -1, -1, -1

4. Consider the following logical statements:

R: If $p \rightarrow q$ is false, then $p \vee q$ is false.

S: If $p \leftrightarrow q$ is false, then $p \vee q$ is false.

Evaluate the truth values of R and S.

(A) Both R and S are true

(B) R is true and S is false

(C) R is false and S is true

(D) Both R and S are false

5. Evaluate the integral: $\int \frac{2x}{x^2-5x+4} dx$

(A) $\frac{8}{3} \log |x-4| - \frac{2}{3} \log |x-1| + C$

(B) $\frac{2}{3} \log |x-4| - \frac{8}{3} \log |x-1| + C$

(C) $\frac{8}{3} \log |x - 1| - \frac{2}{3} \log |x - 4| + C$

(D) $\frac{2}{3} \log |x - 1| - \frac{8}{3} \log |x - 4| + C$
