



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:** 100 Multiple Choice Questions (Biology).
- (iv) **Compulsory Questions:** All 200 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 $y = y(x)$ satisfies the differential equation

$$\left(\frac{2 + \sin x}{1 + y} \right) \frac{dy}{dx} = -\cos x$$

and $y(0) = 2$, then $y\left(\frac{\pi}{2}\right)$ is equal to:

- (1) 3
- (2) 4
- (3) 2
- (4) 1

2. The ratio of areas bounded by the curves $y = \cos x$ and $y = \cos 2x$ between $x = 0, x = \frac{\pi}{3}$ and the x -axis is:

- (A) 2 : 1
 - (B) 1 : 2
 - (C) 1 : 1
 - (D) 1 : 3
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3. If $(2 + \sin x) \frac{dy}{dx} + (y + 1) \cos x = 0$ and $y(0) = 1$, then find the value of $y\left(\frac{\pi}{2}\right)$.

- (A) $-\frac{2}{3}$
 - (B) $-\frac{1}{3}$
 - (C) $\frac{4}{3}$
 - (D) $\frac{1}{3}$
-

4. If $\left(\frac{2+\sin x}{1+y}\right) \frac{dy}{dx} = -\cos x$ and $y(0) = 2$, then find the value of $y\left(\frac{\pi}{2}\right)$.

- (1) 3
 - (2) 4
 - (3) 2
 - (4) 1
-

5. If $(2 + \sin x) \frac{dy}{dx} + (y + 1) \cos x = 0$ and $y(0) = 1$, then $y\left(\frac{\pi}{2}\right)$ is equal to:

- (1) $-\frac{2}{3}$
 - (2) $-\frac{1}{3}$
 - (3) $\frac{4}{3}$
 - (4) $\frac{1}{3}$
-

6. Solve for x :

$$x + \log_{15}(5 + 3^x) = x \log_{15} 5 + \log_{15} 24$$

- (1) 2
 - (2) 1
 - (3) 5
 - (4) 8
-

7. For $n \in \mathbb{N}$, if $y = ax^{n+1} + bx^{-n}$, then $x^2 \frac{d^2 y}{dx^2}$ is equal to:

- (1) $(n-1)y$
 - (2) $n(n-1)y$
 - (3) $n(n+1)y$
 - (4) $(n+1)y$
-

8. Solve for x :

$$x + \log_{15}(5 + 3^x) = x \log_{15} 5 + \log_{15} 24$$

- (A) 2
 - (B) 1
 - (C) 5
 - (D) 8
-

9. For $n \in \mathbb{N}$, if $y = ax^{n+1} + bx^{-n}$, then $x^2 \frac{d^2 y}{dx^2}$ is equal to:

- (1) $(n-1)y$
- (2) $n(n-1)y$
- (3) $n(n+1)y$
- (4) $(n+1)y$

10. Let

$$f(x) = \int_1^4 \log[x] dx$$

where $[x]$ denotes the greatest integer function. Then the value of $f(x)$ is:

- (A) $\log 2$
 - (B) $\log 3$
 - (C) $\log 5$
 - (D) $\log 6$
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