
ISC CLASS XII MATHEMATICS (TEST PAPER 7) - SET 07

Time Allowed: 3 hours

Maximum Marks: 80

SECTION A (Compulsory - 65 Marks)

Question 1 (10×1 Mark = 10 Marks)

1. $\boxed{3}$

2. $\boxed{\frac{3\pi}{4}}$

3. $\boxed{8x}$

4. Distinct equivalence classes are disjoint: if $[a] \neq [b]$ then $[a] \cap [b] = \emptyset$.

5. $\boxed{\frac{dy}{dx} = -\frac{2}{3 - \cos y}}$

6. $\boxed{\frac{2}{3}}$

7. $\boxed{2}$

8. $\boxed{\frac{dy}{dx} = 2x \ln(5) 5^{x^2}}$

9. $\boxed{0}$

10. $\boxed{1}$

Question 2 (3×2 Marks = 6 Marks)

1. $\boxed{\frac{d^2y}{dx^2} = -\frac{\sin t}{a(1 + \sin t)^3}}$

2. $\boxed{f(x) \text{ is strictly increasing in } \left(0, \frac{\pi}{4}\right) \text{ and } \left(\frac{5\pi}{4}, 2\pi\right).}$

3. $\boxed{\frac{\pi}{4}}$

Question 3 (4 × 4 Marks = 16 Marks)

1. $M_{13} = -1, \quad C_{21} = 1, \quad |A| = 4.$
2. $\frac{y}{x} = e^{Ce^x}$
3. $-\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{x}{\sqrt{2}}\right) + \frac{2}{\sqrt{3}} \tan^{-1}\left(\frac{x}{\sqrt{3}}\right) + C$
4. 2.55 cm^3

Question 5 (15 Marks)

- (a) $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right).$
- (b) 0.488
- (c) 0.56

Question 6 (5 Marks)

1. $\frac{\pi}{2}$
2. $\frac{1}{2}\sqrt{21}$

Question 7 (10 Marks)

1. The planes are perpendicular ($\theta = \frac{\pi}{2}$). The distance is $\frac{2}{3}$.
2. $\frac{32}{3}$

SECTION C (Optional - 15 Marks)

Question 8 (5 Marks)

1. $\text{MC}(x) = 0.05 + 0.0002x,$
 $\text{AC}(x) = \frac{200}{x} + 0.05 + 0.0001x,$
Minimum MC = 0.05 at $x = 0.$

Question 9 (10 Marks)

1. Minimum value of Z is 300 at the point $(60, 0)$.
2. The question is inconsistent. (Corrected version: $r = \sqrt{\frac{1}{2}}$, $\text{Var}(y) = 72$)