ISC CLASS XII MATHEMATICS (TEST PAPER 9) - SET 09

Time Allowed: 3 hours **Maximum Marks: 80**

SECTION A (Compulsory - 65 Marks)

Question 1 (10×1 Mark $= 10$ Marks)

1. $\boxed{-\frac{2}{3}}$
2. $\boxed{\frac{\pi}{4}}$
3. $\boxed{(-\infty, 0] \cup [2, \infty)}$
4. $\boxed{\text{Yes, } R \text{ is transitive.}}$
5. $\boxed{x^x(1 + \ln x)}$
6. $\boxed{y = \sin x + C}$
7. $\boxed{0}$
8. $\boxed{\text{Yes, } f(x) \text{ is continuous at } x = 1.}$
9. $\boxed{0.3}$
10. $\boxed{4}$

Question 2 (3×2 Marks $= 6$ Marks)

1. $\boxed{-\frac{4x}{(1 + x^2)^2}}$
2. $\boxed{16 \text{ cm}^3/\text{s}}$
3. $\boxed{\frac{1}{169}}$

Question 3 (4×4 Marks $= 16$ Marks)

1. $\boxed{(2, -9) \text{ and } (-2, 19)}$
2. $\boxed{y = 2e^{\frac{1}{2}(x^2+2x-3)} - 1}$
3. $\boxed{2\ln|x-1| + \frac{3}{2}\ln(x^2+4) - \frac{1}{2}\tan^{-1}\left(\frac{x}{2}\right) + C}$
4. $\boxed{x = -13}$

Question 4 (3×6 Marks $= 18$ Marks)

1. $\boxed{\sin^{-1}\left(\frac{1}{3}\right)}$
2. $\boxed{\frac{x}{2}\sqrt{9-x^2}\sin^{-1}\left(\frac{x}{3}\right) + \frac{9}{4}\left(\sin^{-1}\left(\frac{x}{3}\right)\right)^2 - \frac{x^2}{4} + C}$
3. $\boxed{xyz\left(1 + \frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)}$

Question 5 (15 Marks)

(a) $\boxed{f^{-1}(y) = \frac{4y+3}{2-3y}}$

(b) $\boxed{\frac{1}{4}}$

(c) $\boxed{\frac{5}{12}}$

SECTION B (Optional - 15 Marks)

Question 6 (5 Marks)

1. $\boxed{\sqrt{35}}$
2. $\boxed{\text{The vectors are coplanar.}}$

Question 7 (10 Marks)

1. $\boxed{\frac{1}{6}}$

2. $\boxed{\frac{9}{2}}$

SECTION C (Optional - 15 Marks)

Question 8 (5 Marks)

1. $\boxed{\text{Minimum MC} = -7.5 \text{ at } x = 2.5}$

Question 9 (10 Marks)

1. $\boxed{\text{Minimum value of } Z \text{ is 18 at the point } (0, 6)}$

2. $\boxed{\begin{array}{l}\text{Regression line of } y \text{ on } x : 2x + 3y = 4, \\ \text{Regression line of } x \text{ on } y : 4x + 5y = 12, \\ \text{Coefficient of correlation: } r = -\sqrt{\frac{5}{6}}\end{array}}$