
ISC CLASS XII MATHEMATICS (TEST PAPER 4) - SET 04

Time Allowed: 3 hours

Maximum Marks: 80

SECTION A (Compulsory)

Question 1 (10×1 Mark = 10 Marks)

1. $e = 0$

2. $\frac{5\pi}{6}$

3. $[1, 2]$

4. $\frac{dy}{dx} = -\frac{x}{y}$

5. $\frac{dy}{dx} = e^{\tan x} \cdot \sec^2 x$

6. 1

7. $\cos x$

8. 0.7

9. $\frac{1}{5}$

10. $(1, \frac{5}{3})$ and $(-1, \frac{1}{3})$

11. $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ (Correction: The result is the zero matrix.)

Question 2 (3×2 Marks = 6 Marks)

1. Rolle's theorem is verified with $c = \frac{3\pi}{4}$

2. $y' = (\log x)^x \left(\log \log x + \frac{1}{\log x} \right) + x^{\log x} \cdot \frac{2 \log x}{x}$

3. $\frac{2}{3}$ (Probability that the problem is solved)

Question 3 (4×4 Marks = 16 Marks)

1. $y = 2x + 3$
2. $\frac{dV}{dt} = 900 \text{ cm}^3/\text{s}$
3. $\frac{\pi}{12}$
4. $y = -1$ (and there is no variable named x in the matrix)

Question 4 (3×6 Marks = 18 Marks)

1. Maximum area $A_{\max} = 2ab$
2. $\int e^{2x} \sin(3x) dx = \frac{e^{2x}}{13} (2 \sin 3x - 3 \cos 3x) + C$
3. $x \tan^{-1} y - e^{\tan^{-1} y} = C$

Question 5 (15 Marks)

- (a) f is not one-one on $\mathbb{R}$, hence not invertible.
On $[0, \infty)$, $f^{-1}(x) = \sqrt{x - 4}$, $x \geq 4$.
- (b) $x = 1$, $y = 2$, $z = 3$
- (c) $P(A|\text{defective}) = \frac{10}{29} \approx 0.345$

SECTION B (Optional - 15 Marks)

Question 6 (5 Marks)

1. Area = $\sqrt{42}$
2. Altitude from A to $BC = \frac{2\sqrt{65}}{3}$

Question 7 (10 Marks)

1. $7x - 8y + 3z + 25 = 0$
2. Area = $\frac{1}{6}$ (Area between the curves)

SECTION C (Optional - 15 Marks)

Question 8 (5 Marks)

- $x = 5,$
1. Profit at $x = 5$ is 18,
 $p = 10$

Question 9 (10 Marks)

(a) $Z_{\max} = \frac{235}{19}$ at $\left(\frac{20}{19}, \frac{45}{19}\right)$

(b) Regression of y on x : $\hat{y} = 0.7x + 1,$
Regression of x on y : $\hat{x} = \frac{56}{45}y + \frac{4}{3},$
Coefficient of correlation: $r = \frac{14}{15} \approx 0.9333$