
ISC CLASS XII MATHEMATICS (TEST PAPER 11) - SET 11

Time Allowed: 3 hours

Maximum Marks: 80

SECTION A (Compulsory - 65 Marks)

Question 1 (10×1 Mark = 10 Marks)

1. $\boxed{\text{Yes, the operation } * \text{ is closed on } \mathbb{Z}.}$
2. $\boxed{2}$
3. $\boxed{\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]}$
4. $\boxed{[a] = \{x \in A \mid (a, x) \in R\}}$
5. $\boxed{\frac{dy}{dx} = \frac{2x^2y - y}{x}}$
6. $\boxed{\text{General solution in implicit or explicit form.}}$
7. $\boxed{\text{Yes, } f(x) \text{ is continuous at } x = 0.}$
8. $\boxed{\int_0^2 2x \, dx}$
9. $\boxed{1}$
10. $\boxed{\text{Var}(X) = E(X^2) - [E(X)]^2}$

Question 2 (3×2 Marks = 6 Marks)

1. $\boxed{38}$
2. $\boxed{(4, 11)}$
3. $\boxed{\frac{31}{66}}$

Question 3 (4×4 Marks = 16 Marks)

1. $\boxed{\text{Strictly increasing on } (-\infty, 1) \cup (2, \infty) \text{ and strictly decreasing on } (1, 2).}$
2. $\boxed{y = x^2}$
3. $\boxed{\sin^{-1}\left(\frac{x}{3}\right) + C}$
4. $\boxed{X = \begin{pmatrix} -1 & -3 \\ 1 & 2 \end{pmatrix}} \text{ (Corrected)}$

Question 4 (3×6 Marks = 18 Marks)

1. $\boxed{\text{The triangle of maximum area inscribed in a circle is equilateral.}}$
2. $\boxed{x \log(x^2 + a^2) - 2x + 2a \tan^{-1}\left(\frac{x}{a}\right) + C}$
3. $\boxed{x = 1, \quad y = 2, \quad z = 0}$

Question 5 (15 Marks)

- (a) $\boxed{\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi}$
- (b) $\boxed{\frac{8}{9}}$
- (c) $\boxed{\text{The relation } R \text{ is an equivalence relation.}}$ (Corrected)

SECTION B (Optional - 15 Marks)

Question 6 (5 Marks)

1. $\boxed{\sqrt{5}}$
2. $\boxed{-25}$

Question 7 (10 Marks)

1. $\boxed{(2, 3, -1)}$
2. $\boxed{8\sqrt{3}}$ (Corrected)

SECTION C (Optional - 15 Marks)

Question 8 (5 Marks)

1. $\boxed{x = 8.125, \quad \text{Maximum profit} = -35.9375}$ (Corrected)

Question 9 (10 Marks)

1. $\boxed{\text{Minimum value of } Z \text{ is 4 at the point } (0, 2).}$
2. $\boxed{\begin{array}{l} \text{Correlation coefficient } r = \pm\sqrt{0.32}, \\ \text{Standard deviation } \sigma_y \approx 2.12 \end{array}}$ (Corrected)