

01-24-2023-shift-2-16-30

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- 1) Let $y = y(x)$ be the solution of the differential equation $(x^2 - 3y^2)dx + 3xydy = 0, y(1) = 1$. Then $6y^2(e)$ is equal to (January 2023)
 - a) $3e^2$
 - b) e^2
 - c) $2e^2$
 - d) $\frac{3e^2}{2}$
- 2) Let p and q be two statements. Then $\neg(p \wedge (p \Rightarrow \neg q))$ is equivalent to (January 2023)
 - a) $p \vee (p \wedge (\neg q))$
 - b) $p \vee ((\neg p) \wedge q)$
 - c) $(\neg p) \vee q$
 - d) $p \vee (p \wedge q)$
- 3) The number of square matrices of order 5 with entries from the set $\{0, 1\}$, such that the sum of all the elements in each row is 1 and the sum of all the elements in each column is also 1, is (January 2023)
 - a) 225
 - b) 120
 - c) 150
 - d) 125
- 4) $\int_{\frac{3\sqrt{2}}{4}}^{\frac{3\sqrt{3}}{4}} \frac{48}{\sqrt{9-4x^2}} dx$ is equal to (January 2023)
 - a) $\frac{\pi}{3}$
 - b) $\frac{\pi}{2}$
 - c) $\frac{\pi}{6}$
 - d) 2π
- 5) Let A be a 3×3 matrix such that $|adj(adj(adjA))| = 12^4$. Then $|A^{-1}adjA|$ is equal to (January 2023)
 - a) $2\sqrt{3}$
 - b) $\sqrt{6}$
 - c) 12
 - d) 1

I. SECTION-B

- 1) The urns A, B and C contain 4 red, 6 black; 5 red, 5 black and λ red, 4 black balls respectively. One of the urns is selected at random and a ball is drawn. If the ball drawn is red and the probability that it is drawn from urn C is 0.4 then the square of the length of the side of the largest equilateral triangle, inscribed in the parabola $y^2 = \lambda x$ with one vertex at the vertex of the parabola is (January 2023)
- 2) If the area of the region bounded by the curves $y^2 - 2y = -x, x + y = 0$ is A , then $8A$ is equal to (January 2023)
- 3) If $\frac{1^3+2^3+3^3+\dots\text{upto } n \text{ terms}}{1 \cdot 3+2 \cdot 5+3 \cdot 7+\dots\text{upto } n \text{ terms}} = \frac{9}{5}$, then the value of n is (January 2023)
- 4) If f be a differentiable function defined on $[0, \frac{\pi}{2}]$ such that $f(x) > 0$ and $f(x) + \int_0^x f(t) \sqrt{1 - (\log_e f(t))^2} dt = e, \forall x \in [0, \frac{\pi}{2}]$. Then $\left(6 \log_e f\left(\frac{\pi}{6}\right)\right)^2$ is equal to (January 2023)

- 5) The minimum number of elements that must be added to the relation $R = \{(a, b), (b, c), (b, d)\}$ on the set $\{a, b, c, d\}$ so that it is an equivalence relation, is _____. (January 2023)
- 6) Let $\mathbf{a} = \hat{i} + 2\hat{j} + \lambda\hat{k}$, $\mathbf{b} = 3\hat{i} - 5\hat{j} - \lambda\hat{k}$, $\mathbf{a} \cdot \mathbf{c} = 7$, $2\mathbf{b} \cdot \mathbf{c} + 43 = 0$, $\mathbf{a} \times \mathbf{c} = \mathbf{b} \times \mathbf{c}$. Then $|\mathbf{a} \cdot \mathbf{b}|$ is equal to (January 2023)
- 7) Let the sum of the coefficients of the first three terms in the expansion of $\left(x - \frac{3}{x^2}\right)^n$, $x \neq 0, n \in N$, be 376. Then the coefficient of x^4 is _____. (January 2023)
- 8) If the shortest distance between the lines $\frac{x+\sqrt{6}}{2} = \frac{y-\sqrt{6}}{3} = \frac{z-\sqrt{6}}{4}$ and $\frac{x-\lambda}{3} = \frac{y-2\sqrt{6}}{4} = \frac{z+2\sqrt{6}}{5}$ is 6, then square of sum of all possible values of λ is (January 2023)
- 9) Let $S = \{\theta \in [0, 2\pi) : \tan(\pi \cos \theta) + \tan(\pi \sin \theta) = 0\}$. Then $\sum_{\theta \in S} \sin^2\left(\theta + \frac{\pi}{4}\right)$ is equal to (January 2023)
- 10) The equations of the sides AB, BC and CA of a triangle ABC are respectively: $2x = y = 0$, $x + py = 21a$, ($a \neq 0$) and $x - y = 3$ respectively. Let $\mathbf{P}(2, a)$ be the centroid of $\triangle ABC$. then $(BC)^2$ is equal to (January 2023)