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1) Let $y = y(x)$ be the solution of the differential equation $\left(x^2 - 3y^2\right)dx + 3xydy = 0, y(1) = 1$. Then $6y^2(e)$ is equal to
   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
   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
   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
   a) $\frac{\pi}{3}$
   b) $\frac{\pi}{2}$
   c) $\frac{\pi}{6}$
   d) $2\pi$
5) Let $A$ be a $3 \times 3$ matrix such that $|adj(adj(adjA))| = 12^4$.Then $\left|A^{-1}adjA\right|$ is equal to
   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 $\lambda$ 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
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
3) If $\frac{1^3+2^3+3^3+\cdots\text{upto n terms}}{1\cdot3+2\cdot5+3\cdot7+\cdots\text{upto n terms}} = \frac{9}{5}$, then the value of $n$ is
4) If f be a differentiable function defined on $\lfloor 0, \frac{\pi}{2} \rfloor$ such that $f(x) >$ and $f(x)+\int_0^x f(t)\sqrt{1-(\log_e f(t))^2}dt = e, \forall x \in \lfloor 0, \frac{\pi}{2} \rfloor$.Then $\left(6\log_e f\left(\frac{\pi}{6}\right)\right)^2$ is equal to
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 _____ .

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
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 _____ .
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 $\lambda$ is
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
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 $\Delta ABC$. then $(BC)^2$ is equal to