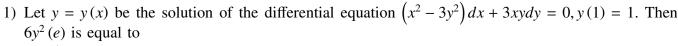
## 01-24-2023-shift-2-16-30

## AI24BTECH11011 - Himani Gourishetty



- a)  $3e^{2}$
- b)  $e^2$
- c)  $2e^2$
- 2) Let p and q be two statements. Then  $\neg (p \land (p \Rightarrow \neg q))$  is equivalent to
  - a)  $p \lor (p \land (\neg q))$
  - b)  $p \vee ((\neg p) \wedge q)$
  - c)  $(\neg p) \lor q$
  - d)  $p \lor (p \land q)$
- 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) 
$$\int_{\frac{3\sqrt{3}}{4}}^{\frac{3\sqrt{3}}{4}} \frac{48}{\sqrt{9-4x^2}} dx$$
 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  $|A^{-1}adjA|$  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  $\frac{1^3 + 2^3 + 3^3 + \cdots \text{upto n terms}}{1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + \cdots \text{upto n terms}} = \frac{9}{5}$ , then the value of n is
- 4) If f be a differentiable function defined on  $[0, \frac{\pi}{2}]$  such that  $f(x) > \text{and } f(x) + \int_0^x f(t) \sqrt{1 (\log_e f(t))^2} dt = \frac{1}{2} \int_0^x f(t) dt$  $e, \forall x \in [0, \frac{\pi}{2}]$ . Then  $\left(6 \log_e f\left(\frac{\pi}{6}\right)\right)^2$  is equal to
- 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  $\left(x-\frac{3}{x^2}\right)^n$ ,  $x \neq 0$ ,  $n \in \mathbb{N}$ , 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  $\sum_{\theta \in S} \sin^2(\theta + \frac{\pi}{4})$  is equal to 10) The equations of the sides AB, BC and CA of a triangle ABC are respectively: 2x = y = 0, x + py = 0 $21a, (a \neq 0)$  and x - y = 3 respectively. Let  $\mathbf{P}(2, a)$  be the centroid of  $\triangle ABC$ , then  $(BC)^2$  is equal to