

JEE Questions 3

EE24BTECH11012

- 1) Let \mathbf{A} and \mathbf{B} be 3×3 real matrices such that \mathbf{A} is symmetric matrix and \mathbf{B} is skew-symmetric matrix. Then the system of linear equations $(\mathbf{A}^2\mathbf{B}^2 - \mathbf{B}^2\mathbf{A}^2)\mathbf{X} = \mathbf{O}$, where \mathbf{X} is a 3×1 column matrix of unknown variables and \mathbf{O} is a 3×1 null matrix, has: [Feb 2021]
- a unique solution
 - exactly two solutions
 - infinitely many solutions
 - no solution
- 2) If $n \geq 2$ is a positive integer, then the sum of the series ${}^{n+1}C_2 + 2({}^2C_2 + {}^3C_2 + {}^4C_2 + \cdots + {}^nC_2)$ is [Feb 2021]
- $\frac{n(n+1)^2(n+2)}{12}$
 - $\frac{n(n-1)(2n+1)}{6}$
 - $\frac{n(n+1)(2n+1)}{6}$
 - $\frac{n(2n+1)(3n+1)}{6}$
- 3) If a curve $y = f(x)$ passes through the point $(1, 2)$ and satisfies $x \frac{dy}{dx} + y = bx^4$, then for what value of b , $\int_1^2 f(x) dx = \frac{62}{5}$ holds good? [Feb 2021]
- 5
 - $\frac{62}{5}$
 - $\frac{31}{5}$
 - 10
- 4) The area of the region: $\mathbf{R} \{(x, y) : 5x^2 \leq y \leq 2x^2 + 9\}$ is : [Feb 2021]
- $9\sqrt{3}$
 - $12\sqrt{3}$
 - $11\sqrt{3}$
 - $6\sqrt{3}$
- 5) Let $f(x)$ be a differentiable function defined on $[0, 2]$ such that $f'(x) = f'(2-x)$ for all $x \in (0, 2)$, $f(0) = 1$ and $f(2) = e^2$. Then the value of $\int_0^2 f(x) dx$ is: [Feb 2021]
- $1 + e^2$
 - $1 - e^2$
 - $2(1 - e^2)$
 - $2(1 + e^2)$

I. INTEGER-TYPE QUESTIONS

- 1) The number of real roots of the equation $(x+1)^2 + |x-5| = \frac{27}{4}$ is : [Feb 2021]
- 2) The students S_1, S_2, \dots, S_{10} are to be divided into 3 groups A, B and C such that each group has at least one student and the group C has at most 3 students. Then the total number of possibilities of forming such groups is : [Feb 2021]
- 3) If $a + \alpha = 1$, $b + \beta = 2$ and $af(x) + \alpha(1)x = bx + \frac{\beta}{2}$, $x \neq 0$ then the value of the expression $\frac{[f(x) + f(\frac{1}{x})]}{(x + \frac{1}{x})}$ is : [Feb 2021]
- 4) If the variance of 10 natural numbers $1, 1, 1, \dots, 1, k$ is less than 10, then the maximum possible value of k is : [Feb 2021]
- 5) Let λ be an integer. If the shortest distance between the lines $x - \lambda = 2y - 1 = -2z$ and $x = y + 2\lambda = z - \lambda$ is $\frac{\sqrt{7}}{2\sqrt{2}}$, then the value of $|\lambda|$ is : [Feb 2021]
- 6) If $i = \sqrt{-1}$. If $\frac{(-1+i\sqrt{3})^2}{(1-i)^2} + \frac{(1+i\sqrt{3})^2}{(1+i)^2} = k$, and $n = [k]$ be the greatest integral part of $|k|$. Then $\sum_{j=0}^{n+5} (j+5)^2 - \sum_{j=0}^{n+5} (j+5)$ is equal to :
- 7) Let a point \mathbf{P} be such that its distance from the point $(5, 0)$ is thrice the distance of \mathbf{P} from the point $(-5, 0)$. If the locus of the point \mathbf{P} is a circle of radius r , then $4r^2$ is equal to : [Feb 2021]
- 8) The maximum value of k for which the sum $\sum_{i=0}^k {}^{10}C_i {}^{15}C_{k-i} + \sum_{i=0}^{k+1} {}^{12}C_i {}^{13}C_{k+1-i}$ exists, is equal to : [Feb 2021]
- 9) The sum of first four terms of a geometric progression is $\frac{65}{12}$ and the sum of their respective reciprocals is $\frac{65}{18}$. If the product of first three terms of the G.P. is 1, and the third term is α then 2α is :
- 10) If the area of the triangle formed by the positive x-axis, the normal and the tangent to the circle $(x-2)^2 + (y-3)^2 = 25$ at the point $(5, 7)$ is A , then $24A$ is equal to : [Feb 2021]