

2023-April

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EE24BTECH11033 - KOLLURU SURAJ

- 16) The number of ways, in which 5 girls and 7 boys can be seated at a round table so that no two girls sit together, is (April-2023)
- a) $7(720)^2$ b) 720 c) $7(360)^2$ d) $126(5!)^2$
- 17) Let $f(x) = \frac{\sin x + \cos x - \sqrt{2}}{\sin x - \cos x}$, $x \in [0, \pi] - \{\frac{\pi}{4}\}$. Then $f\left(\frac{7\pi}{12}\right)f''\left(\frac{7\pi}{12}\right)$ is equal to (April-2023)
- a) $-\frac{2}{3}$ b) $\frac{2}{9}$ c) $-\frac{1}{3\sqrt{3}}$ d) $\frac{2}{3\sqrt{3}}$
- 18) If the equation of the plane containing the line $x + 2y + 3z - 4 = 0$, $2x + y - z + 5 = 0$ and perpendicular to the plane $\mathbf{r} = (\mathbf{i} - \mathbf{j}) + \lambda(\mathbf{i} + \mathbf{j} + \mathbf{k}) + \mu(\mathbf{i} - 2\mathbf{j} + 3\mathbf{k})$ is $ax + by + cz = 4$, then $(a - b + c)$ is equal to (April-2023)
- a) 22 b) 24 c) 20 d) 18
- 19) Let $A = \begin{pmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$. If $|\text{adj}|\text{adj}|\text{adj} 2A|| = (16)^n$, then n is equal to (April-2023)
- a) 8 b) 9 c) 12 d) 10
- 20) Let $I(x) = \int \frac{(x+1)}{x(1+xe^x)^2} dx$, $x > 0$. If $\lim_{x \rightarrow \infty} I(x) = 0$, then $I(1)$ is equal to (April-2023)
- a) $\frac{e+1}{e+2} - \log_e(e+1)$ c) $\frac{e+2}{e+1} - \log_e(e+1)$
b) $\frac{e+2}{e+1} + \log_e(e+1)$ d) $\frac{e+1}{e+2} + \log_e(e+1)$
- 21) Let $A = [0, 3, 4, 6, 7, 8, 9, 10]$ and R be the relation defined on A such that $R = \{(x, y) \in A \times A : x - y \text{ is an odd positive integer or } x - y = 2\}$. The minimum number of elements that must be added to the relation R so that it is a symmetric relation is equal to (April-2023)
- 22) Let $[t]$ denote the greatest integer $\leq t$. If the constant term in the expansion of $\left(3x^2 - \frac{1}{2x^3}\right)^7$ is α , then $[\alpha]$ is equal to (April-2023)
- 23) Let λ_1, λ_2 be the values of λ for which the points $\left(\frac{5}{2}, -1, \lambda\right)$ and $(-2, 0, 1)$ are at equal distance from the plane $2x + 3y - 6z + 7 = 0$. If $\lambda_1 > \lambda_2$, then the distance of the point $(\lambda_1 - \lambda_2, \lambda_2, \lambda_1)$ from the line $\frac{x-5}{1} = \frac{y-1}{2} = \frac{z+7}{2}$ (April-2023)

- 24) If the solution curve of the differential equation $(y - 2 \log_e x) dx + (x \log_e x^2) dy = 0$, $x > 1$ passes through the points $(e, \frac{4}{3})$ and (e^4, α) , then α is equal to (April-2023)
- 25) Let $\mathbf{a} = 6\mathbf{i} + 9\mathbf{j} + 12\mathbf{k}$, $\mathbf{b} = \alpha\mathbf{i} + 11\mathbf{j} - 2\mathbf{k}$ and \mathbf{c} be vectors such that $\mathbf{a} \times \mathbf{c} = -\mathbf{a} \times \mathbf{b}$. If $\mathbf{a} \cdot \mathbf{c} = -12$, $\mathbf{c} \cdot (\mathbf{i} - 2\mathbf{j} + \mathbf{k}) = 5$, then $\mathbf{c} \cdot (\mathbf{i} + \mathbf{j} + \mathbf{k})$ is equal to (April-2023)
- 26) The largest natural number n such that 3^n divides $66!$ is (April-2023)
- 27) If a_n is the greatest term in the sequence $a_n = \frac{n^3}{n^4 + 147}$, $n=1,2,3,\dots$, then a is equal to (April-2023)
- 28) Let the mean and variance of 8 numbers $x, y, 10, 12, 6, 12, 4, 8$ be 9 and 9.25 respectively. If $x > y$, then $3x - 2y$ is equal to (April-2023)
- 29) Consider a circle $C_1 : x^2 + y^2 - 4x - 2y = \alpha - 5$. Let its mirror image in the line $y = 2x + 1$ be another circle $C_2 : 5x^2 + 5y^2 - 10fx - 10gy + 36 = 0$. Let r be the radius of C_2 . Then $\alpha + r$ is equal to (April-2023)
- 30) Let $[t]$ denote the greatest integer $\leq t$. Then $\frac{2}{\pi} \int_{\pi/6}^{5\pi/6} (8 [\operatorname{cosec} x] - 5 [\cot x]) dx$ is equal to (April-2023)