

2023-January-25 Shift-2

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AI24BTECH11005 - Prajwal Naik

16) Let N be the sum of the numbers appeared when two fair dice are rolled and let the probability that $N - 2, \sqrt{3}N, N + 2$ are in geometric progression be $\frac{k}{48}$. Then the value of k is:

a) 2

c) 16

b) 4

d) 8

17) The integral $16 \int_1^2 \frac{dx}{x^3(x^2+2)^2}$ is equal to

a) $\frac{11}{6} + \ln 4$

b) $\frac{11}{12} + \ln 4$

c) $\frac{11}{12} - \ln 4$

d) $\frac{11}{6} - \ln 4$

18) Let T and C be the transverse and conjugate axes of the hyperbola $16x^2 - y^2 + 64x + 4y + 44 = 0$. Then the area of the region above parabola $x^2 = y + 4$, below the transverse axis T and on the right of the conjugate axis C is :

a) $4\sqrt{6} + \frac{44}{3}$

b) $4\sqrt{6} + \frac{28}{3}$

c) $4\sqrt{6} - \frac{44}{3}$

d) $4\sqrt{6} - \frac{28}{3}$

19) Let $\vec{d} = -\hat{i} - \hat{j} + \hat{k}$, $\vec{d} \cdot \vec{b} = 1$ and $\vec{d} \times \vec{b} = \hat{i} - \hat{j}$. Then $\vec{d} - 6\vec{b}$ is equal to

a) $3(\hat{i} - \hat{j} - \hat{k})$

c) $3(\hat{i} - \hat{j} + \hat{k})$

b) $3(\hat{i} + \hat{j} + \hat{k})$

d) $3(\hat{i} + \hat{j} - \hat{k})$

20) The foot of perpendicular of the point $(2, 0, 5)$ on the line $\frac{x+1}{2} = \frac{y-1}{5} = \frac{z+1}{-1}$ is (α, β, γ) . Then Which of the following is not correct?

a) $\frac{\alpha\beta}{\gamma} = \frac{4}{15}$

c) $\frac{\beta}{\gamma} = -5$

b) $\frac{\alpha}{\beta} = -8$

d) $\frac{\gamma}{\alpha} = \frac{5}{8}$

21) For the two positive numbers a, b , if a, b and $\frac{1}{18}$ are in a geometric progression, while $\frac{1}{a}, 10, \frac{1}{b}$ are in an arithmetic progression, then, $16a + 12b$ is equal to :

22) Points $P(-3, 2), Q(9, 10), R(\alpha, 4)$ lie on a circle C with PR as its diameter. The tangents to C at the points Q and R intersect at the point S . If S lies on the line $2x - ky = 1$, then K is equal to

23) Let $a \in \mathbb{R}$ and let α, β be the roots of the equation $x^2 + 60^{\frac{1}{4}}x + a = 0$. If $\alpha^4 + \beta^4 = -30$, then the product of all possible values of a is .

24) Suppose Anil's mother wants to give 5 whole fruits to anil from a basket of 7 red apples, 5 white apples and 8 oranges. If in the selected 5 fruits, at least 2 orange, at least one red apple and at least one white apple must be given, then the number of

ways , Anil's mother can offer 5 fruits to Anil is .

- 25) If m and n respectively are the numbers of positive and negative values of θ in the interval $[-\pi, \pi]$ that satisfy the equation $\cos 2\theta \cos \frac{\theta}{2} = \cos 3\theta \cos \frac{9\theta}{2}$, then the value of mn is equal to .
- 26) The number of numbers, strictly between 5000 and 10000 can be formed using the digits 1,3,5,7,9 without repetition, is
- 27) The remainder when $(2023)^{2023}$ is divided by 35 is
- 28) If the shortest distance between the line joining the points $(1, 2, 3)$ and $(2, 3, 4)$ and the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-2}{0}$ is α , then $28\alpha^2$ is equal to .
- 29) 25percent of the population are smokers A smoker has 27 times more chances to develop lung cancer than a non-smoker. A person is diagnosed with lung cancer and the probability that this person is a smoker is $\frac{k}{10}$. Then the value of K is .
- 30) A triangle is formed by $X - axis$, $Y - axis$ and the line $3x + 4y = 60$. Then the number of points $P(a, b)$ which lie strictly inside the triangle, where a is an integer and b is a multiple of a , is .