jee-main-maths-06-04-2023-shift-2

EE24BTECH11047 - Niketh Prakash Achanta

16) The sum of all values of α, for which the points whose position vectors are $\hat{i} - 2\hat{j} + 3\hat{k}, 2\hat{i} - 3\hat{j} + 4\hat{k}, (\alpha + 1)\hat{i} + 2\hat{k}$ and $9\hat{i} + (\alpha - 8)\hat{j} + 6\hat{k}$ are coplanar, is equal to

a) -2 b) 2 c) 6 d) 4

17) Let the line **L** pass through the point $(0, 1, 2)$, intersect the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and be parallel to the plane $2x + y - 3z = 4$. Then the distance of $\mathbf{P}(1, -9, 2)$ from the line **L** is

a) 9 b) $\sqrt{54}$ c) $\sqrt{69}$ d) $\sqrt{74}$

18) All the letters of the word PUBLIC are written in all possible orders and these words are written as in a dictionary with serial numbers. Then the serial number of the word PUBLIC is :

a) 580 b) 578 c) 576 d) 582

19) Let the vectors $\mathbf{a}, \mathbf{b}, \mathbf{c}$ represent three coterminous edges of a parallelepiped of volume V. Then the volume of the parallelepiped, whose coterminous edges are represented by $\mathbf{a}, \mathbf{b} + \mathbf{c}$ and $\mathbf{a} + \mathbf{2b} + \mathbf{3c}$ is equal to:

a) 2V b) 6V c) 3V d) V

20) Among the statements :
$(S1)$: $2023^{2022} - 1999^{2022}$ is divisible by 8
$(S2)$: $13(13)^n - 11n - 13$ is divisible by 144 for infinitely many n $\in$ **N**

a) only $(S2)$ is correct
b) only $(S1)$ is correct
c) both $(S1)$ and $(S2)$ are incorrect
d) both $(S1)$ and $(S2)$ are correct

21) The value of $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ$ is:

22) If $(20)^{19} + 2(21)(20)^{18} + 3(21)^2(20)^{17} + \cdots + 20(21)^{19} = k(20)^{19}$, then k is equal to

23) Let the eccentricity of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is reciprocal to that of the hyperbola $2x^2 - 2y^2 = 1$. If the ellipse intersects the hyperbola at right angles, then square of length of the latus-rectum of the ellipse is:

24) For $\alpha, \beta, z \in \mathbf{C}$ and $\lambda > 1$, if $\sqrt{\lambda - 1}$ is the radius of the circle $|z - \alpha|^2 + |z - \beta|^2 = 2\lambda$, then $|\alpha - \beta|$ is equal to

25) Let a curve $y = f(x)$, $x \in (0, \infty)$ pass through the points $\mathbf{P}\left(1, \frac{3}{2}\right)$ and $\mathbf{Q}\left(a, \frac{1}{2}\right)$. If the tangent at any point $\mathbf{R}(b, f(b))$ to the given curve cuts the y-axis at the points $\mathbf{S}(0, c)$ such that $bc = 3$, then $(PQ)^2$ is equal to

26) If the lines $\frac{x-1}{2} = \frac{2-y}{-3} = \frac{z-3}{\alpha}$ and $\frac{x-4}{5} = \frac{y-1}{2} = \frac{z}{\beta}$ intersect, then the magnitude of the minimum value of $8\alpha\beta$ is:

27) Let $f(x) = \frac{x}{(1+x^n)^{1/n}}$, $x \in \mathbf{R} - \{-1\}, n \in N, n > 2$. If $f^n(x) = n(fofof \cdots \text{upto n times})(x)$, then
$\lim_{n\to\infty} \int_0^1 x^{n-2}(f^n(x))\,dx$ is equal to

28) If the mean and variance of the frequency distribution.

x_i	2	4	6	8	10	12	14	16
f_i	4	4	α	15	8	β	4	5

are 9 and 15.08 respectively, then the value of $\alpha^2 + \beta^2 - \alpha\beta$ is

29) The number of points, where the curve $y = x^5 - 20x^3 + 50x + 2$ crosses the x-axis is:

30) The number of 4-letter words, with or without meaning, each consisting of 2 vowels and 2 consonants, which can be formed from the letters of the word UNIVERSE without repetition is: