8,April,2024 Shift-2 16-30

EE24BTECH11050 - Pothuri Rahul

16) If the line segment joining the points $(5,2)$ and $(2,a)$ subtends an angle $\frac{\pi}{4}$ at the origin, then the absolute value of the product of all possible values of a is :

a) 4 b) 2 c) 6 d) 8

17) If the shortest distance between the lines $\frac{x-\lambda}{2} = \frac{y-4}{3} = \frac{z-3}{4}$ and $\frac{x-2}{4} = \frac{y-4}{6} = \frac{z-7}{8}$ is $\frac{13}{\sqrt{29}}$, then the value of λ is :

a) -1 b) 1 c) $\frac{13}{25}$ d) $-\frac{13}{25}$

18) The number of ways five alphabets can be chosen from the alphabets of the word MATHEMATICS, where the chosen alphabets are not necessarily distinct, is equal to :

a) 175 b) 179 c) 181 d) 177

19) if $\alpha \neq a, \beta \neq b, \gamma \neq c$ and $\begin{vmatrix} \alpha & b & c \\ a & \beta & c \\ a & b & \gamma \end{vmatrix} = 0$, then $\frac{a}{\alpha-a} + \frac{b}{\beta-b} + \frac{\gamma}{\gamma-c}$ is equal to :

a) 2 b) 3 c) 0 d) 1

20) For $a, b > 0$, let $f(x) = \begin{cases} \frac{\tan((a+1)x)+b\tan x}{x} & , x < 0; \\ 3 & , x = 0; \\ \frac{\sqrt{ax+b^2x^2}-\sqrt{ax}}{b\sqrt{ax}\sqrt{x}} & , x > 0; \end{cases}$ be a continuous function at $x = 0$. Then $\frac{b}{a}$ is equal to :

a) 5 b) 4 c) 6 d) 8

21) Let a ray of light passing through the point $(3,10)$ reflects on the line $2x+y=6$ and then reflected ray passes through the point $(7,2)$. If the equation of the incident ray is $ax+by+1=0$, then a^2+b^2+3ab is equal to _____.

22) Let $\alpha|x| = |y|e^{xy-\beta}, \alpha, \beta \in \mathbb{N}$ be the solution of the differential equation $xdy - ydx + xy(xdy + ydx) = 0$, $y(1) = 2$. Then $\alpha+\beta$ is equal to _____.

23) Let $a, b, c \in \mathbb{N}$ and $a < b < c$. Let the mean, the mean deviation about the mean and the variance of the 5 observations $9, 25, a, b, c$ be 18 , 4 and $\frac{136}{5}$, respectively. Then $2a+b-c$ is equal to _____.

24) Let **S** be the focus of the hyperbola $\frac{x^2}{3} - \frac{y^2}{5} = 1$, on the positive x-axis. Let C be the circle its centre at $\mathbf{A}\left(\sqrt{6}, \sqrt{5}\right)$ and passing through the points **S**. If **O** is the origin

and SAB is a diameter of C, then the square of the area of the triangle OSB is equal to _____.

25) Let A be the region enclosed by the parabola $y^2 = 2x$ and the line $x = 24$. Then the maximum area of the rectangle inscribed in the region A is: _____.

26) An arithmetic progression is written in the following way

			2			
		5		8		
	11		14		17	
20		23		26		29
----	----	----	----	----	----	----
----	----	----	----	----	----	----

The sum of all the terms in 10th row is _____.

27) The number of distinct real roots of the equation $|x+1|\,|x+3| - 4\,|x+2| + 5 = 0$ is _____.

28) If $\alpha = \lim\limits_{x\to 0^+}\left(\frac{e^{\sqrt{\tan x}} - e^{\sqrt{x}}}{\sqrt{\tan x} - \sqrt{x}}\right)$ and $\beta = \lim\limits_{x\to 0}(1+\sin x)^{\frac{1}{2}\cot x}$ are the roots of the quadratic equation $ax^2 + bx - \sqrt{e} = 0$, then $12\log_e(a+b)$ is equal to _____.

29) If $\int \frac{1}{\sqrt[5]{(x-1)^4(x+3)^6}}dx = A\left(\frac{\alpha x-1}{\beta x+3}\right)^B + C$, where C is constant of integration, then the value of $\alpha+\beta+20AB$ is _____.

30) let $\mathbf{P}(\alpha,\beta,\gamma)$ be the image of the point $\mathbf{Q}(1,6,4)$ in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$. Then $2\alpha+\beta+\gamma$ is equal to _____.