MAINS

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16) If $\frac{dy}{dx} = \frac{xy}{x^2+y^2}$ and $y(1) = 1$, then a value of x satisfying $y(x) = e$ is:

    a) $\sqrt{3}e$
    b) $\frac{1}{2}\sqrt{3}e$
    c) $\sqrt{2}e$
    d) $\frac{e}{\sqrt{2}}$

17) If one end of focal chord AB of the parabola $y^2 = 8x$ is at $A\left(\frac{1}{2}, -2\right)$, then the equation of the tangent at B is:

    a) $x + 2y + 8 = 0$
    b) $2x - y - 24 = 0$
    c) $x - 2y + 8 = 0$
    d) $2x + y - 24 = 0$

18) Let a_n be the n^{th} term of a G.P. of positive terms. If $\sum_{n=1}^{100} a_{2n+1} = 200$ and $\sum_{n=1}^{100} a_{2n} = 100$, then $\sum_{n=1}^{200} a_n$ is equal to:

    a) 300
    b) 175
    c) 225
    d) 150

19) A random variable X has the following probability distribution. Then $P(X > 2)$ is:

X	1	2	3	4	5
P(X)	K^2	$2K$	K	$2K$	$5K^2$

    a) $\frac{7}{12}$
    b) $\frac{23}{26}$
    c) $\frac{1}{36}$
    d) $\frac{1}{6}$

20) If $\int \frac{d\theta}{\cos^2\theta(\tan 2\theta+\sec 2\theta)} = \lambda \tan\theta + 2\log_e |f(\theta)| + C$, where C is the constant of integration, then the ordered point $(\lambda, f(\theta))$ is:

    a) $(-1, 1 - \tan\theta)$
    b) $(-1, 1 + \tan\theta)$
    c) $(1, 1 + \tan\theta)$
    d) $(1, 1 - \tan\theta)$

21) Let **a**, **b**, and **c** be three vectors such that $\left|\vec{a}\right| = 3$, $\left|\vec{b}\right| = 5$,$\vec{a} \cdot \vec{b} = 10$ and the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$. If $\vec{a}$ is perpendicular to vector $\vec{b} \times \vec{c}$, then $\left|\vec{a} \times \left(\vec{b} \times \vec{c}\right)\right|$ is equal to ______

22) If $C_r = {}^{25}C_r$ and $C_0 + 5 \cdot C_1 + 9 \cdot C_2 + \cdots + 101 \cdot C_{25} = 2^{25}.k$ then k is equal to ______

23) If the curves $x^2 - 6x + y^2 + 8 = 0$ and $x^2 - 8y + y^2 + 16 - k = 0$, $(k > 0)$ touch each other at a point , then the largest value of k is ______

24) The number of terms common to the A.P.'s $3, 7, 11, \ldots, 407$ and $2, 9, 16, \ldots, 709$ is ______

25) If the distance between the plane , $23x - 10y - 2z + 48 = 0$ and the plane containing the lines $\frac{x+1}{2} = \frac{y-3}{4} = \frac{z+1}{3}$ and $\frac{x+3}{2} = \frac{y+2}{6} = \frac{z-1}{\lambda}$, $(\lambda \in R)$ is equal to $\frac{k}{\sqrt{633}}$ the k is equal to ______