

- 16) If $1 + (1 - 2^2 \cdot 1) + (1 - 4^2 \cdot 3) + (1 - 6^2 \cdot 5) + \dots + (1 - 20^2 \cdot 19) = \alpha - 220\beta$, then the ordered pair (α, β) is equal to : [Sep-2020]
- (10, 97)
 - (11, 103)
 - (10, 103)
 - (11, 97)
- 17) Let $y = y(x)$ be the solution of the differential equation, $xy' - y = x^2(x \cos x + \sin x)$, $x > 0$. If $y(\pi) = \pi$, then $y''\left(\frac{\pi}{2}\right) + y\left(\frac{\pi}{2}\right)$ is equal to : [Sep-2020]
- $2 + \frac{\pi}{2}$
 - $1 + \frac{\pi}{2}$
 - $1 + \frac{\pi}{2} + \frac{\pi^2}{4}$
 - $2 + \frac{\pi}{2} + \frac{\pi^2}{4}$
- 18) The value of $\sum_{r=0}^{20} \binom{50-r}{6}$ is equal to : [Sep-2020]
- $\binom{51}{7} + \binom{30}{7}$
 - $\binom{51}{7} - \binom{30}{7}$
 - $\binom{50}{7} - \binom{30}{7}$
 - $\binom{50}{6} - \binom{30}{6}$
- 19) Let f be a twice differential function on $(1, 6)$. If $f(2) = 8$, $f'(2) = 5$, $f'(x) \geq 1$ and $f''(x) \geq 4$, for all $x \in (1, 6)$, then : [Sep-2020]
- $f(5) \leq 10$
 - $f'(5) + f''(5) \leq 20$
 - $f(5) + f'(5) \geq 28$
 - $f(5) + f'(5) \leq 26$
- 20) If $(a + \sqrt{2}b \cos x)(a - \sqrt{2}b \cos y) = a^2 - b^2$, where $a > b > 0$, then $\frac{dx}{dy}$ at $\left(\frac{\pi}{4}, \frac{\pi}{4}\right)$ is : [Sep-2020]
- $\frac{a+b}{a-b}$
 - $\frac{a-2b}{a+2b}$
 - $\frac{a-b}{a+b}$
 - $\frac{a+b}{2a-b}$
- 21) Suppose a differentiable function $f(x)$ satisfies the identity $f(x+y) = f(x) + f(y) + xy^2 + x^2y$, for all real x and y . If $\lim_{x \rightarrow 0} \frac{f(x)}{x} = 1$, then $f'(3)$ is equal to... [Sep-2020]
- 22) If the equation of a plane P , passing through the intersection of the planes, $x + 4y - z + 7 = 0$ and $3x + y + 5z = 8$ is $ax + by + 6z = 15$ for some $a, b \in R$, then the distance of the point $(3, 2, -1)$ from the plane P is... units [Sep-2020]
- 23) If the system of equations
- $$x - 2y + 3z = 9$$

$$2x + y + z = b$$

$x - 7y + az = 24$, has infinitely many solutions, then $a - b$ is equal to ... [Sep-2020]

24) Let $(2x^2 + 3x + 4)^{10} = \sum_{r=0}^{20} a_r x^r$. Then $\frac{a_7}{a_{13}}$ is equal to... [Sep-2020]

25) The probability of a man hitting a target is $\frac{1}{10}$. The least number of shots required, so that the probability of his hitting the target at least once is greater than $\frac{1}{4}$, is... [Sep-2020]