

- 16) Bag I contains 3 red, 4 black and 3 white balls and Bag II contains 2 red, 5 black and 2 white balls. One ball is transferred from Bag I to Bag II and then a ball is drawn from Bag II. The ball so drawn is found to be black in color. Then the probability, that the transferred ball is red, is : [Jul-2022]

- a) $\frac{4}{9}$
- b) $\frac{5}{18}$
- c) $\frac{1}{6}$
- d) $\frac{3}{10}$

- 17) Let $S = \{z = x + iy : |z - 1 + i| \geq |z|, |z| < 2, |z + i| = |z + 1|\}$. Then the set of all values of x , for which $w = 2x + iy \in S$ for some $y \in R$, is [Jul-2022]

- a) $\left[-\sqrt{2}, \frac{1}{2\sqrt{2}}\right]$
- b) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{4}\right]$
- c) $\left[-\sqrt{2}, \frac{1}{2}\right]$
- d) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{2\sqrt{2}}\right]$

- 18) Let a, \vec{b}, \vec{c} be three coplanar concurrent vectors such that angles between two of them is same. If the product of their magnitudes is 14 and $(\vec{a} \times \vec{b}) \cdot (\vec{b} \times \vec{c}) + (\vec{b} \times \vec{c}) \cdot (\vec{c} \times \vec{a}) + (\vec{c} \times \vec{a}) \cdot (\vec{a} \times \vec{b}) = 168$ then $|\vec{a}| + |\vec{b}| + |\vec{c}|$ is equal to : [Jul-2022]

- a) 10
- b) 14
- c) 16
- d) 18

- 19) The domain of the function $f(x) = \sin^{-1}\left(\frac{x^2-3x+2}{x^2+2x+7}\right)$ is : [Jul-2022]

- a) $[1, \infty)$
- b) $(-1, 2]$
- c) $[-1, \infty)$
- d) $(-\infty, 2]$

- 20) The statement $(p \implies q) \vee (p \implies r)$ is NOT equivalent to : [Jul-2022]

- a) $(p \wedge (\sim r)) \implies q$
- b) $(\sim q) \implies ((\sim r) \vee p)$
- c) $p \implies (q \vee r)$
- d) $(p \wedge (\sim q)) \implies r$

- 21) The sum and product of mean and variance of a binomial distribution are 82.5 and 1350 respectively. They the number of trials in the binomial distribution is : [Jul-2022]
- 22) Let α, β ($\alpha > \beta$) be the roots of the quadratic equation $x^2 - x - 4 = 0$. If $P_n = \alpha^n - \beta^n, n \in N$, then $\frac{P_{15}P_{16} - P_{14}P_{16} - P_{15}^2 + P_{14}P_{15}}{P_{13}P_{14}}$ is equal to ... [Jul-2022]
- 23) Let $x = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ and $A = \begin{pmatrix} -1 & 2 & 3 \\ 0 & 1 & 6 \\ 0 & 0 & -1 \end{pmatrix}$. For $k \in N$, if $x^T A^k x = 33$, then k is equal to : [Jul-2022]
- 24) The number of natural numbers lying between 1012 and 23421 that can be formed using the digits 2, 3, 4, 5, 6 (*repetition of digits is not allowed*) and divisible by 55 is... [Jul-2022]
- 25) If $\sum_{K=1}^{10} K^2 \left(\binom{10}{K} \right)^2 = 22000L$, then L is equal to ... [Jul-2022]
- 26) If $[t]$ denotes the greatest integer $\leq t$, then the number of points, at which the function $f(x) = 4|2x + 3| + 8\left[x + \frac{1}{2}\right] - 12[x + 20]$ is not differentiable in the open interval $(-20, 20)$, is... [Jul-2022]
- 27) If the tangent to the curve $x^3 - x^2 + x$ at the point (a, b) is also tangent to the curve $y = 5x^2 + 2x - 25$ at the point $(2, -1)$ then $|2a + 9b|$ is equal to ... [Jul-2022]
- 28) Let AB be a chord of length 12 of the circle

$$(x - 2)^2 + (y + 1)^2 = \frac{169}{4}$$

[Jul-2022] If the tangents drawn to the circle at points A and B intersect at point P , then five times the distance of point P from chord AB is equal to ... [Jul-2022]

- 29) Let \vec{a} and \vec{b} be two vectors such that $|\vec{a} + \vec{b}|^2 = |\vec{a}|^2 + 2|\vec{b}|^2, \vec{a} \cdot \vec{b} = 3$ and $|\vec{a} \times \vec{b}|^2 = 75$. Then $|\vec{a}|^2$ is equal to ... [Jul-2022]
- 30) Let $S = \{(x, y) \in N \times N: 9(x - 3)^2 + 16(y - 4)^2 \leq 144\}$
and $T = \{(x, y) \in R \times R: (x - 7)^2 + (y - 4)^2 \leq 36\}$.
The $n(S \cap T)$ is equal to ... [Jul-2022]