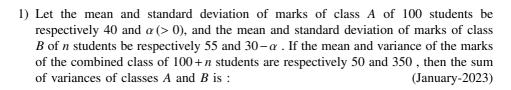
31-01-2023- shift-2

EE24BTECH11010 - Balaji B



a) 450

c) 650

b) 900

d) 500

2) Let $\mathbf{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\mathbf{b} = \hat{i} - \hat{j} + 2\hat{k}$ and $\mathbf{c} = 5\hat{i} - 3\hat{j} + 3\hat{k}$ be three vectors. If \mathbf{r} is a vector such that, $\mathbf{r} \times \mathbf{b} = \mathbf{c} \times \mathbf{b}$ and $\mathbf{r} \cdot \mathbf{a} = 0$, then $25 |\mathbf{r}|^2$ is equal to :

(January-2023)

1

a) 336

c) 339

b) 449

d) 560

3) Let H be the hyperbola, whose foci are $(1 \pm \sqrt{2}, 0)$ and eccentricity is $\sqrt{2}$. Then the length of its latus rectum is: (January-2023)

a) $\frac{5}{2}$

b) $\bar{3}$

c) 2 d) $\frac{3}{2}$

4) Let $\alpha > 0$. If $\int_0^\alpha \frac{x}{\sqrt{x+\alpha}-\sqrt{x}} dx = \frac{16+20\sqrt{2}}{15}$, then α is equal to: (January-2023)

a) 4

c) $2\sqrt{2}$ d) $\sqrt{2}$

b) 2

5) The complex number $z = \frac{i-1}{\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}}$ is equal to:

(January-2023)

a) $\sqrt{2} \left(\cos \frac{5\pi}{12} + i \sin \frac{5\pi}{12} \right)$ b) $\cos \frac{\pi}{12} - i \sin \frac{\pi}{12}$

c) $\sqrt{2} \left(\cos \frac{\pi}{12} + i \sin \frac{\pi}{12} \right)$ d) $\sqrt{2}i \left(\cos \frac{5\pi}{12} - i \sin \frac{5\pi}{12} \right)$

6) The coefficient of x^{-6} , in the expansion of $\left(\frac{4x}{5} + \frac{5}{2x^2}\right)^9$, is

(January-2023)

7) Let the area of the region $\{(x,y): |2x-1| \le y \le |x^2-x|, 0 \le x \le 1\}$ be A. Then $(6A + 11)^2$ is equal to

(January-2023)

8) If ${}^{2n+1}P_{n-1}:{}^{2n-1}P_n=11:21$, then n^2+n+15 is equal to:

(January-2023)

9) If the constant term in the binomial expansion of $\left(\frac{x^{\frac{5}{2}}}{2} - \frac{4}{x^{l}}\right)^{9}$ is -84 and the coefficient of x^{-3l} is $2^{\alpha}\beta$, where $\beta < 0$ is an odd number, then $|\alpha l - \beta|$ is equal to

(January-2023)

10) Let \mathbf{a} , \mathbf{b} , \mathbf{c} be three vectors such that $|\mathbf{a}| = \sqrt{31}$, $4|\mathbf{b}| = |\mathbf{c}| = 2$ and $2(\mathbf{a} \times \mathbf{b}) = 3(\mathbf{c} \times \mathbf{a})$. If the angle between \mathbf{b} and \mathbf{c} is $\frac{2\pi}{3}$, then $\left(\frac{\mathbf{a} \times \mathbf{c}}{\mathbf{a} \cdot \mathbf{b}}\right)^2$ is equal to

(January-2023)

11) Let S be the set of all $a \in \mathbb{N}$ such that the area of the triangle formed by the tangent at the point P(b,c), $b,c \in \mathbb{N}$, on the parabola $y^2 = 2ax$ and the lines x = b, y = 0 is 16 unit², then $\sum_{a \in S} a$ is equal to

(January-2023)

12) The sum $1^2 - 2 \cdot 3^2 + 3 \cdot 5^2 - 4 \cdot 7^2 + 5 \cdot 9^2 - \dots + 15 \cdot 29^2$ is

(January-2023)

13) Let *A* be the event that the absolute difference between two randomly choosen real numbers in the sample space [0,60] is less than or equal to *a* . If $P(A) = \frac{11}{36}$, then *a* is equal to

(January-2023)

14) Let $A = [a_{ij}], a_{ij} \in \mathbb{Z} \cap [0,4], 1 \le i, j \le 2$. The number of matrices A such that the sum of all entries is a prime number $p \in (2,13)$ is

(January-2023)

15) Let A be a $n \times n$ matrix such that |A| = 2. If the determinant of the matrix $\operatorname{Adj}\left(2 \cdot \operatorname{Adj}\left(2A^{-1}\right)\right)$ is 2^{84} , then n is equal to

(January-2023)