jee-main-maths-31-01-2024-shift-2

EE24BTECH11030 - J.KEDARANANDA

1) The number of ways in which 21 identical apples can be distributed among three children such that each child gets at least 2 apples, is

a) 406 b) 130 c) 142 d) 136

2) Let A (a, b), B(3, 4) and (-6, -8) respectively denote the centroid, circumcentre and orthocentre of a triangle. Then, the distance of the point P(2a + 3, 7b + 5) from the line 2x + 3y - 4 = 0 measured parallel to the line x - 2y - 1 = 0 is

a) $\frac{15\sqrt{5}}{7}$ b) $\frac{17\sqrt{5}}{6}$ c) $\frac{17\sqrt{5}}{7}$ d) $\frac{\sqrt{5}}{17}$

3) Let z_1 and z_2 be two complex number such that $z_1 + z_2 = 5$ and $z_1^3 + z_2^3 = 20 + 15i$. Then $|z_1^4 + z_2^4|$ equal-

a) $30\sqrt{3}$ b) 75 c) $15\sqrt{15}$ d) $25\sqrt{3}$

4) Let a variable line passing through the centre of the circle $x^2 + y^2 - 16x - 4y = 0$, meet the positive co-ordinate axes at the point A and B. Then the minimum value of OA + OB, where O is the origin, is equal to

a) 12 b) 18 c) 20 d) 24

5) Let f,g :(0,∞) be two functions defined by $f(x) = \int_{-x}^{x}(|t| - t^2)e^{-r^2}dt$ and g(x) = $\int_0^{x^2} t^{\frac{1}{2}}e^{-t}dt$. Then the value of (f($\sqrt{\ln 9}$) + $g(\sqrt{\ln 9})$) is equal to

a) 6 b) 9 c) 8 d) 10

6) Let (α, β, γ) be mirror image of the point (2, 3, 5) in the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$. Then $2\alpha + 3\beta + 4\gamma$ is equal to

a) 32 b) 33 c) 31 d) 34

7) Let P be a parabola with vertex (2, 3) and directrix 2x + y = 6. Let an ellipse E : $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$,a > b of eccentricity $\frac{1}{\sqrt{2}}$ pass through the focus of the parabola P. Then the square of the length of the latus rectum of E, is

a) $\frac{385}{8}$ b) $\frac{347}{8}$ c) $\frac{512}{25}$ d) $\frac{656}{25}$

8) The temperature T(t) of a body at time t = 0 is 160 °F and it decreases continuously as per the differential equation $\frac{dT}{dt} = -K(T - 80)$, where K is positive constant. If T(15) = 120 °F, then T(45) is

a) 85 °F
b) 95 °F
c) 90 °F
d) 80 °F

9) If 2nd, 8th, 44th terms of A.P. are 1st, 2nd and 3rd terms respectively of G.P. and first term of A.P. is 1 then the sum of first 20 terms of A.P. is

a) 970 b) 916 c) 980 d) 990

10) Let f : → R → (0,∞) be strictly increasing function such that $\lim_{x\to\infty} \frac{f(7x)}{f(x)}$. Then, the value of $\lim_{x\to\infty} \left[\frac{f(5x)}{f(x)} - 1\right]$ is equal to

a) 4 b) 0 c) $\frac{7}{5}$ d) 1

11) The area of the region enclosed by the parabolas $y = 4 - x^2$ and $3y = (x - 4)^2$ is in (sq. unit)?

a) $\frac{14}{3}$ b) 4 c) $\frac{32}{3}$ d) 6

12) Let the mean and the variance of 6 observation a, b, 68, 44, 48, 60 be 55 and 194, respectively if a > b, then a + 3b is

a) 200 b) 190 c) 180 d) 210

13) If the function f : $(-\infty, -1] \to (a, b]$ defined by f(x) = e^{x^3-3x+1} is one-one and onto, then the distance of the point $\mathbf{P}\left(2b + 4, a + 2\right)$ from the line x + e^{-3}y = 4 is :

a) 18 b) 20 c) 24 d) 32

14) Consider the function f : $(0, \infty) \to R$ defined by $f(x) = e^{-|\ln x|}$. If m and n be respectively the number of points at which f is not continuous and f is not differentiable, then m + n is

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

15) The number of solutions, of the equation $e^{\sin x} - 2e^{-\sin x} = 2$ is

a) 2 b) more than 2 c) 1 d) 0