2024-April-5-Shift-2

AI24BTECH11005 - Prajwal Naik

1) 60 words can be made using all the letters of the word BHBJO with or without meaning. If these words are written as in a dictionary , then the 50^{th} word is:

a) OBBJH b) JBBOH c) HBBJO d) OBBHJ

2) Let the $S = \{2, 4, 8, 16....., 512\}$ be partioned into 3 sets , A,B,C with equal number of elements such that $AUBUC = S$, and $A \bigcap B = B \bigcap C = C \bigcap A = \phi$. The maximum number of such possible partitions of S is equal to

a) 1680 b) 1520 c) 1710 d) 1640

3) The area enclosed between the curves $y = x|x|$ and $y = x - |x|$ is :

a) 1 b) $\frac{8}{3}$ c) $\frac{4}{3}$ d) $\frac{2}{3}$

4) If the constant term in the expansion of $(\frac{3^{0.2}}{x} + \frac{2x}{5^{\frac{1}{3}}})^{12}$, $x \neq 0$, $\alpha.2^8.3^{0.2}$, then 25α is equal to :

a) 639 b) 693 c) 742 d) 724

5) Consider three vectors $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$, Let $\overrightarrow{a} = 2, \overrightarrow{b} = 3$ and $\overrightarrow{a} = \overrightarrow{b}X\overrightarrow{c}$, $\alpha \in [0, \frac{\pi}{3}]$, is the angle between the vectors $\overrightarrow{b}$ and $\overrightarrow{c}$, then the minimum value of $\left|\overrightarrow{c} - \overrightarrow{a}\right|^2$ is equal to:

a) 124 b) 110 c) 105 d) 121

6) Let $\beta(m, n) = \int_0^1 x^{m-1}(1 - x)^{n-1}dx, m, n \geq 0$, If $\int_0^1 (1 - x^10)^20dx = a.\beta(b, c)$, then 100(a+b+c) equals:

a) 1021 b) 1120 c) 2012 d) 2120

7) Let (α, β, γ) be the image of the point $(8, 5, 7)$ in the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-2}{5}$, then $\alpha + \beta + \gamma$ is equal to :

a) 18 b) 16 c) 20 d) 14

8) For $x \geq 0$, the least value of K, for which $4^{1+x} + 4^{1-x}, \frac{k}{2}, 16^x + 16^{-x}$, are three consecutive terms of an AP , is equal to

a) 4 b) 10 c) 16 d) 8

9) $y(\theta) = \frac{2\cos\theta+\cos 2\theta}{\cos 3\theta+4\cos 2\theta+5\cos\theta+2}$, then at $\theta = \frac{\pi}{2}$, $y'' + y' + y$ is equal to :

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

10) Let $S_1 = \{z \in C : |z| \leq 5\}$, $S_2 = \left\{z \in C : Im(\frac{z+1-\sqrt{3}i}{1-\sqrt{3}i})\right\}$

a) $\frac{125\pi}{24}$ b) $\frac{125\pi}{6}$ c) $\frac{125\pi}{12}$ d) $\frac{125\pi}{4}$

11) Let the circle $C_1 : x^2 + y^2 - 2(x + y) + 1 = 0$, and C_2 be a circle having centre at $(-1, 0)$ and radius 2 . If the line of common chord of $C1$and C_2 intersects the y-axis at the point P , then the square of the distance of P from the centre C_1 is :

a) 6 b) 2 c) 4 d) 1

12) The differential equation of the family of circles passing through the origin and having centre at the line $y = x$ is:

a) $(x^2 - y^2 + 2xy)dx = (x^2 - y^2 - 2xy)dy$
b) $(x^2 + y^2 + 2xy)dx = (x^2 + y^2 - 2xy)dy$
c) $(x^2 + y^2 - 2xy)dx = (x^2 + y^+2xy)dy$
d) $(x^2 - y^2 + 2xy)dx = (x^2 - y^2 + 2xy)dy$

13) $f : [-1, 2] \to R$, be given by $f(x) = 2x^2 + x + [x^2] - [x]$, The number of points , where f is not continuous is:

a) 19 b) 38 c) 57 d) 76

14) let $f, g : R \to R$ be defined as : $f(x) = |x - 1|$ and $g(x) = e^x, when x \geq 0, g(x) = x+1, x \leq 0$ Then $f(g(x))$ is

a) neither one-one nor onto
b) both one-one and onto
c) one-one not onto
d) onto but not one-one

15) The coefficients a,b,c in the quadratic equation $ax^2 + bx + c = 0$ are from the set $\{1, 2, 3, 4, 5, 6\}$. If the probability of this equation having one root bigger than the other is p, then 216p is equal to:

a) 19 b) 38 c) 57 d) 76