16-30

AI24BTECH11018 - Sreya

1) Let $\overrightarrow{a} = \hat{i} + \hat{j} + 2\hat{k}$, $\overrightarrow{b} = 2\hat{i} - 3\hat{j} + \hat{k}$ and $\overrightarrow{c} = hati - \hat{j} + \hat{k}$ be three given vectors. Let $\overrightarrow{v}$ be a vector in the plane of $\overrightarrow{a}$ and $\overrightarrow{b}$ whose projection on $\overrightarrow{c}$ is $\frac{2}{\sqrt{3}}$. If $\overrightarrow{v} \cdot \hat{j} = 7$, then$\overrightarrow{v} \cdot \left(\hat{i} + \hat{k}\right)$ is equal to :
   a) 6
   b) 7
   c) 8
   d) 9
2) The mean and standard deviation of 50 observations are 15 and 2 respectively. It was found that one incorrect observation was taken such that the sum of correct and incorrect observation is 70.If the correct mean is 16, then the correct variance is equal to :
   a) 10
   b) 36
   c) 43
   d) 60
3) $16\sin(20°)\sin(40°)\sin(80°)$ is equal to :
   a) $\sqrt{3}$
   b) $2\sqrt{3}$
   c) 3
   d) $4\sqrt{3}$
4) If the inverse trignometric functions take principal values, then $\cos^{-1}\left(\frac{3}{10}\cos\left(\tan^{-1}\left(\frac{4}{3}\right)\right) + \frac{2}{5}\sin\left(\tan^{-1}\left(\frac{4}{3}\right)\right)\right)$ is equal to :
   a) 0
   b) $\frac{\pi}{4}$
   c) $\frac{\pi}{3}$
   d) $\frac{\pi}{6}$
5) Let $r \in p, q, \neg p, \neg q$ be such that the logical statement $r \vee (\neg p) \implies (p \wedge q) \vee r$ is a tautology.Then $'r'$ is equal to :
   a) p
   b) q
   c) $\neg p$
   d) $\neg q$
6) $f : \mathbb{R} \to \mathbb{R}$ satisfy $f(x + y) = 2^x f(y) + 4^y f(x), \forall x, y \in \mathbb{R}$.If $f(2) = 3$, then $14 \cdot \frac{f'(4)}{f'(2)}$ is equal to
7) Let p and q be two real numbers such tht $p + q = 3$ and $p^4 + q^4 = 369$. Then $\left(\frac{1}{p} + \frac{1}{q}\right)^{-2}$ is equal to
8) if $z^2 + z + 1 = 0$, $z \in \mathbb{C}$, then $\left|\sum_{n=1}^{15}\left(Z^n + (-1)^n \frac{1}{Z^n}\right)^2\right|$ is equal to
9) Let $\mathbf{X} = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$,$Y = \alpha I + \beta X + \gamma X^2$ and $Z = \alpha^2 I - \alpha\beta X + \left(\beta^2 - \alpha\gamma\right)X^2, \alpha, \beta, \gamma \in \mathbb{R}$. if $\mathbf{Y^-1} =$ $\begin{pmatrix} \frac{1}{5} & \frac{-2}{5} & \frac{1}{5} \\ 0 & \frac{1}{5} & \frac{-2}{5} \\ 0 & 0 & \frac{1}{5} \end{pmatrix}$ then $(\alpha - \beta + \gamma)^2$ is equal to
10) The total number of $3 - digit$ numbers, whose greatest coomon divisor with 36 is 2, is

11) $(40C_0) + (41C_1) + (42C_2) + \cdots + (60C_{20}) = \frac{m}{n} 60C_{20}$
12) if $a_1(>0), a_2, a_3, a_4, a_5$ are in a $G \cdot P \cdot$, $a_2 + a_4 = 2a_3 + 1$ and $3a_2 + a_3 = 2a_4$, then $a_2 + a_4 + 2a_5$ is equal to
13) The integral $\frac{24}{\pi} \int_0^{\sqrt{2}} \frac{(2-x^2)}{(2+x^2)(\sqrt{4+x^4})}$ is equal to
14) Let a line L_1 be tangent to the hyperbola $\frac{x^2}{16} - \frac{y^2}{4} = 1$ and let L_2 be the line passing through the orgin and perpendicular to L_1. If the locus of the point of intersection of L_1 and L_2 is $\left(x^2 + y^2\right)^2 = \alpha x^2 + \beta y^2$, then $\alpha + \beta$ is equal to
15) If the probability that a randomly chosen $6-digit$ number formed by using digits 1 and 8 only is a multiple of 21 is p, then $96p$ is equal to