ASSIGNMENT-2

EE24BTECH11043 - Murra Rajesh Kumar Reddy

1) The shortest distance between the lines $\frac{x+7}{-6} = \frac{y-6}{7} = z$ and $\frac{7-x}{2} = y-2 = z-6$ is
   a) $2\sqrt{29}$
   b) 1
   c) $\sqrt{\frac{37}{29}}$
   d) $\sqrt{\frac{29}{2}}$
2) Let $\mathbf{a} = \hat{i} - \hat{j} + 2\hat{k}$ and let $\mathbf{b}$ be a vector such that $\mathbf{a} \times \mathbf{b} = 2\hat{i} - \hat{k}$ and $\mathbf{a} \cdot \mathbf{b} = 3$ Then the projection of $\mathbf{b}$ on the vector $\mathbf{a} - \mathbf{b}$ is :
   a) $\frac{2}{\sqrt{21}}$
   b) $2\sqrt{\frac{3}{7}}$
   c) $\frac{2}{3}\sqrt{\frac{7}{3}}$
   d) $\frac{2}{3}$
3) If the mean deviation about median for the number $3, 5, 7, 2k, 12, 16, 21, 24$ arranged in the ascending order, is 6 then the median is
   a) 11.5
   b) 10.5
   c) 12
   d) 11
4) $2\sin\left(\frac{\pi}{22}\right)\sin\left(\frac{3\pi}{22}\right)\sin\left(\frac{5\pi}{22}\right)\sin\left(\frac{7\pi}{22}\right)\sin\left(\frac{9\pi}{22}\right)$ is eqaul to :
   a) $\frac{3}{16}$
   b) $\frac{1}{16}$
   c) $\frac{1}{32}$
   d) $\frac{9}{32}$
5) Consider the following statements :
   P : Ramu is intelligent.
   Q : Ramu is rich.
   R : Ramu is not honest.
   The negation of the statement "Ramu is intelligent and honest if and only if Ramu is not rich" can be expressed as :
   a) $((P \cap (\sim R)) \cap Q)\,((\sim Q) \cap ((\sim P) \cup R))$
   b) $((P \cap R) \cap Q) \cup ((\sim Q) \cap ((\sim P) \cup (\sim R)))$
   c) $((P \cap R) \cap Q) \cap ((\sim Q) \cap ((\sim P) \cup (\sim R)))$
   d) $((P \cap (\sim R)) \cap Q) \cup ((\sim Q) \cap ((\sim P) \cap R))$
6) Let $A = \{1, 2, 3, 4, 5, 6, 7\}$.Define $B = \{T \subset A$: eitther $1 \notin T$or $2 \in T\}$ and $C = \{T \subset A : T$the sum of all the elen
   the number of elements in the set $B \cup c$ is .
7) Let $f(x)$ be a quadractic polynomial with leading coefficient 1 such that $f(0) = p, p \neq 0$. and $f(1) = \frac{1}{3}$.If the equation $f(x) = 0$ and $fofofofof(x) = 0$ have a common real root, then $f(-3)$ is eqaul to .

8) Let $A = \begin{pmatrix} 1 & a & a \\ 0 & 1 & b \\ 0 & 0 & 1 \end{pmatrix}, a, b \in R$.If for some $n \in N, A^n = \begin{pmatrix} 1 & 48 & 2160 \\ 0 & 1 & 96 \\ 0 & 0 & 1 \end{pmatrix}$
then $n + a + b$ is equal to .

9) The sum of the maximum and minimum values of the function $f(x) = |5x - 7| + \left[x^2 + 2x\right]$ in the interval $\left[\frac{5}{4}, 2\right]$, where $[t]$ is the greatest integer $\leq t$, is .

10) Let $y = y(x)$ be the solution of the differential equation
$\frac{dy}{dx} = \frac{4y^3+2yx^2}{3xy^2+x^3}, y(1) = 1$.
If for some $n \in N, y(2) \in [n - 1\ , n)$, then n is equal to .

11) let f be twice differentiable function on R.If $f'(0) = 4$ and $f(x) + \int_0^x (x - 1) f'(t)\, dt = \left(e^{2x} + e^{-2x}\right) \cos 2x + \frac{2}{a}x$,th
$(2a + 5)^5 a^2$ is equal to .

12) Let $a_n = \int_{-1}^{n} \left(1 + \frac{x}{2} + \frac{x^2}{3} + \cdots + \frac{x^{n-1}}{n}\right) dx//$ for every $n \in N$.Then the sum of all the elments of the set $\{n \in N : a_n \in (2, 30)\}$ is .

13) If the circles $x^2+y^2+6x+8y+16 = 0$ and $x^2 + y^2 + 2\left(3 - \sqrt{x}\right)x + 2\left(4 - \sqrt{6}\right)y = k + 6\sqrt{3} + 8\sqrt{6}, k \geq 0$,touch internally at the point $P(\alpha, \beta)$, then $\left(\alpha + \sqrt{3}\right)^2 + \left(\beta + \sqrt{6}\right)^2$ is equal to .

14) Let the area enclosed by the x-axis, and the tangent and normal drawn to the curve $4x^3 - 3xy^2 + 6x^2 - 5xy - 8y^2 + 9x + 14 = 0$ at the point $(-2, 3)$ be A. Then $8A$ is equal to .

15) Let $x = \sin\left(2\tan^{-1}\alpha\right)$ and $y = \sin\left(\frac{1}{2}\tan^{-1}\frac{4}{3}\right)$.If $S = \left\{\alpha \in R : y^2 = 1 - x\right\}$, then $\sum_{\alpha \in S} 16\alpha^3$ is equal to .