Q.No. **MATHEMATICS**

1. If $G(x) = \begin{vmatrix} f(x)f(-x) & 0 & x^4 \\ 3 & f(x)-f(-x) & \cos x \\ x^4 & 2x & f(x)f(-x) \end{vmatrix}$, then $\int_{-2}^{2} x^4\, G(x)dx$ is equal to

A) -1 B) 0 C) 2 D) 1

2. If $1, \alpha_1, \alpha_2, \alpha_3$ are the fourth roots of unity, then the value of $(1+\alpha_1)(1+\alpha_2)(1+\alpha_3)$ is equal to

A) -3 B) -1 C) 0 D) 2

3. A conic has focus $(1,0)$ and corresponding directrix $x + y = 5$. If the eccentricity of the conic is *2*, then its equation is

A) $x^2 + 4xy + y^2 + 18x - 20y + 49 = 0$ B) $x^2 - 4xy + y^2 - 18x - 20y + 49 = 0$

C) $x^2 + 4xy + y^2 - 18x + 20y + 49 = 0$ D) $x^2 + 4xy + y^2 - 18x - 20y + 49 = 0$

4. Let $\bar{u}$, $\bar{v}$, $\bar{\omega}$ to be three vectors such that $|\bar{u}| = 1$, $|\bar{v}| = 2$, $|\bar{\omega}| = 3$ and $\bar{v}$ and $\bar{\omega}$ are mutually perpendicular. If projection of $\bar{v}$ along $\bar{u}$ is equal to that of $\bar{\omega}$ along $\bar{u}$ then $|\bar{u} - \bar{v} + \bar{\omega}|$ equals to

A) $\sqrt{7}$ B) 14 C) 2 D) $\sqrt{14}$

5. A plane at a unit distance from the origin intersects the coordinate axes at P, Q and R. If the locus of the centroid of ΔPQR satisfies the equation $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = k$, then the value of *k* is

A) 3 B) 4 C) 9 D) 16

6. If g be an inverse function of *f* and $f'(x) = \frac{1}{1+x^5}$, then $g'(x)$ will be :

A) $1 + x^5$ B) $1 + \big(g(x)\big)^5$ C) $\left(\frac{1}{1+g(x)}\right)^5$ D) $(g(x))^5$

7. The area enclosed between the curves $y = |x^3|$ and $x = y^3$ is

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{8}$ D) $\frac{1}{16}$

8. Let $f(x)$ be a differential function such that $f'(x) = f(x) + \int_0^2 f(x)dx$ and $f(0) = \frac{(4-e^2)}{3}$. Then $f(x)$ is:

A) $e^x - \frac{(e^2-1)}{3}$ B) $e^x - \frac{(e^2-1)}{4}$ C) $e^x - \frac{(e^2+1)}{3}$ D) $e^x - \frac{(4-e^2)}{3}$

9. A coin is tossed n times. The maximum value of n such that the probability of getting no head is greater than $1/16$ is

A) 4 B) 3 C) 5 D) 2

10. Suppose 5- digit numbers are formed by the digits 1,2,3,4 and 5 without repetition. If they are arranged in an ascending order, then 100^{th} number is

A) 51243 B) 51423 C) 51234 D) 51342