

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  $\bar{u}, \bar{v}, \bar{w}$  to be three vectors such that  $|\bar{u}| = 1, |\bar{v}| = 2, |\bar{w}| = 3$  and  $\bar{v}$  and  $\bar{w}$  are mutually perpendicular. If projection of  $\bar{v}$  along  $\bar{u}$  is equal to that of  $\bar{w}$  along  $\bar{u}$  then  $|\bar{u} - \bar{v} + \bar{w}|$  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  $\Delta PQR$  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)  $1 + (g(x))^5$                       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  $100^{\text{th}}$  number is  
 A) 51243                      B) 51423                      C) 51234                      D) 51342