ZERO DOUBTS
Mathematics (BY PANDEY SIR)
Class-12^TH^ WEEKLY ASSIGNMENT

1. The number of matrices of order 3×3, whose entries are either 0 or 1 and the sum of all the entries is a prime number, is _____. [Ans: (282)]
2. If $A = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, I is the unit matrix of order 2 and a, b are arbitrary constants, then $(aI + bA)^2$ is equal to [Ans: (b)]

a) $a^2I + abA$
b) $a^2I + 2abA$
c) $a^2I + b^2A$
d) None of these

3. If $f(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ and if α, β, γ, are angle of a triangle, then $f(\alpha).f(\beta).f(\gamma)$ equals [Ans: (b)]

a) I_2
b) $-I_2$
c) 0
d) None of these

4. If A is a square matrix such that $(A - 2I)(A + I) = 0$, then $A^{-1} =$ [Ans: (a)]

a) $\frac{A-I}{2}$
b) $\frac{A+I}{2}$
c) $2(A - I)$
d) $2A + I$

5. If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$, then $P(Q^{2005})P^T$, equals to [Ans: (a)]

a) $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$
b) $\begin{bmatrix} \frac{\sqrt{3}}{2} & 2005 \\ 1 & 0 \end{bmatrix}$
c) $\begin{bmatrix} 1 & 2005 \\ \frac{\sqrt{3}}{2} & 1 \end{bmatrix}$
d) $\begin{bmatrix} 1 & \frac{\sqrt{3}}{2} \\ 0 & 2005 \end{bmatrix}$

6. A square matrix P satisfies $P^2 = I - P$, where I is the identity matrix. If $P^n = 5I - 8P$, then n is equal to_____. [Ans: (6)]
7. Let $A = \begin{bmatrix} 2 & -2 \\ 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ -1 & 2 \end{bmatrix}$. Then the number of elements in the set $\{(n, m): n, m \in \{1, 2, \dots, 10\}\ and\ nA^n + mB^m = I\}$ is _______. [Ans: (b)]

8. The total number of matrices $A = \begin{bmatrix} 0 & 2y & 1 \\ 2x & y & -1 \\ 2x & -y & 1 \end{bmatrix}$ $(x, y \in R, x \neq y)$ for which $A^T A = 3I_3$ is [Ans: (b)]

a) 2
b) 4
c) 3
d) 6

9. Let $A = \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, $(\alpha \in R)$ such that $A^{32} = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$. Then, a value of α is [Ans: (c)]

a) $\frac{\pi}{32}$
b) 0
c) $\frac{\pi}{64}$
d) $\frac{\pi}{16}$

10. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{bmatrix}$ and I be the identity matrix of order 3. If $Q = [q_{ij}]$ is a matrix, such that $P^{50} - Q = I$, then $\frac{q_{31}+q_{32}}{q_{21}}$ equals [Ans: (b)]

a) 52
b) 103
c) 201
d) 205

11. Let X and Y be two arbitrary, 3×3, non – zero, skew – symmetric matrices and Z be an arbitrary, 3×3, non – zero, symmetric matrix. Then, which of the following matrices is/are skew – symmetric? [Ans: (c, d)]

a) $Y^3Z^4 - Z^4Y^3$
b) $X^{44} + Y^{44}$
c) $X^4Z^3 - Z^3X^4$
d) $X^{23} + Y^{23}$

12. If matrix $A = \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$, where a, b, c are real positive numbers, $abc = 1$ and $A^T A = I$, then find the value of $a^3 + b^3 + c^3$. [Ans: (4)]

13. Let $A = \begin{bmatrix} 1+i & 1 \\ -i & 0 \end{bmatrix}$ where $i = \sqrt{-1}$. Then, the number of elements in the set $\{n \in \{1, 2, \dots \dots, 100\}: A^n = A\}$ is _______. [Ans: (25)]

14. The number of square matrices of order 5 with entries from the set $\{0, 1\}$, such that the sum of all the elements in each row is 1 and the sum of all the elements I each column is also 1 is_____. [Ans: (120)]