Topic :-MATRICES

1. If $A = \begin{bmatrix} 3 & 3 & 3 \\ 3 & 3 & 3 \\ 3 & 3 & 3 \end{bmatrix}$, A^4 is equal to

   a) $27A$ b) $81A$ c) $243A$ d) $729A$

2. If ω is a complex cube root of unity, then the matrix $A = \begin{bmatrix} 1 & \omega^2 & \omega \\ \omega^2 & \omega & 1 \\ \omega & 1 & \omega^2 \end{bmatrix}$ is a

   a) Singular matrix   b) Non-symmetric matrix
   c) Skew-symmetric matrix   d) None of these

3. The values of λ and μ for which of the system of equations $x + y + z = 6$, $x = 2y + 3z = 10$ and $x + 2y + \lambda z = \mu$ have infinite number of solutions, are
   a) $\lambda = 3, \mu = 10$ b) $\lambda = 3, \mu = \neq 10$ c) $\lambda \neq 3, \mu = 10$ d) $\lambda \neq 3, \mu = \neq 10$

4. If A and B are square matrices of the same order such that $(A + B)(A - B) = A^2 - B^2$, than $(ABA^{-1})^2$ is equal to
   a) B^2 b) I c) A^2B^2 d) A^2

5. If A is a skew-symmetric matrix, then trace of A is
   a) 1   b) -1 c) 0   d) None of these

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
   a) 4   b) 5   c) 6   d) 7

7. Let A and B are two square matrices such that $AB = A$ and $BA = B$, then A^2 equals to
   a) B b) A c) I d) O

8. A and B are two square matrices of same order and A' denotes the transpose of A, then
   a) $(AB) = B'A'$
   b) $(AB)' = A'B'$
   c) $AB = 0 \Rightarrow |A| = 0$ or $|B| = O$
   d) $AB = 0 \Rightarrow A = 0$ or $B = 0$

9. The element in the first row and third column of the inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ is

   a) -2 b) 0 c) 1 d) 7

10. If $A = \begin{bmatrix} \cos x & \sin x & 0 \\ -\sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix} = f(x)$, then A^{-1} is equal to

    a) $f(-x)$ b) $f(x)$ c) $-f(x)$ d) $-f(-x)$

11. If $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then A^{-1} is

    a) $-A$ b) A c) 1 d) None of these

12. If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ and $A^2 - kA - 5I_2 = 0$, then the value of k is

    a) 3 b) 5 c) 7 d) -7

13. Consider the following statements :
1. There can exist two matrices A, B of order 2×2 such that $AB - BA = I_2$
2. Positive odd integral power of a skew-symmetric matrix is symmetric

    a) Only (1) b) Only (2) c) Both of these d) None of these

14. If $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -2 & -2 \\ 1 & 3 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 3 \\ 4 \end{bmatrix}$, then $\begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is equal to

    a) $\begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}$ c) $\begin{bmatrix} 5 \\ -2 \\ 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$

15. The number of non-trivial solutions of the system
$x - y + z = 0, x + 2y - z = 0, 2x + y + 3z = 0$ is

    a) 0 b) 1 c) 2 d) 3

16. If $\begin{bmatrix} 1 & -1 & x \\ 1 & x & 1 \\ x & -1 & 1 \end{bmatrix}$ has no inverse, then the real value of x is

    a) 2 b) 3 c) 0 d) 1

17. If $\begin{bmatrix} 2+x & 3 & 4 \\ 1 & -1 & 2 \\ x & 1 & -5 \end{bmatrix}$ is a singular matrix, then x is

    a) $\frac{13}{25}$ b) $-\frac{25}{13}$ c) $\frac{5}{13}$ d) $\frac{25}{13}$

18. The rank of the matrix $A = \begin{bmatrix} 2 & 3 & 1 & 4 \\ 0 & 1 & 2 & -1 \\ 0 & -2 & -4 & 2 \end{bmatrix}$ is

    a) 2 b) 3 c) 1 d) Indeterminate

19. If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$, then

a) $\alpha = a^2 + b^2, \beta = ab$

b) $\alpha = a^2 + b^2, \beta = 2\,ab$

c) $\alpha = a^2 + b^2, \beta = a^2 - b^2$

d) $\alpha = 2\,ab, = a^2 + b^2$

20. If $A = [a_{ij}]$ is a scalar matrix, then trace of A is

a) $\sum_i \sum_j a_{ij}$ b) $\sum_i a_{ij}$ c) $\sum_j a_{ij}$ d) $\sum_i a_{ii}$