1. Let $F(\alpha)=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$. Then $F(\alpha).F(\alpha')$ is equal to

(a) $F(\alpha\alpha')$ (b) $F(\alpha/\alpha')$ (c) $F(\alpha+\alpha')$ (d) $F(\alpha-\alpha')$

2. For the matrix $A=\begin{bmatrix}1 & 1 & 0\\ 1 & 2 & 1\\ 2 & 1 & 0\end{bmatrix}$, which of the following is correct

(a) $A^3+3A^2-I=0$ (b) $A^3-3A^2-I=0$

(c) $A^3+2A^2-I=0$ (d) $A^3-A^2+I=0$

3. If $A=\begin{bmatrix}4 & 2\\ 3 & 4\end{bmatrix}$, then $|adjA|$ is equal to

(a) 16 (b) 10 (c) 6 (d) None of these

4. The inverse of matrix $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$ is

(a) $\begin{bmatrix}d & -b\\ -c & a\end{bmatrix}$ (b) $\frac{1}{ad-bc}\begin{bmatrix}d & -b\\ -c & a\end{bmatrix}$,

(c) $\frac{1}{|A|}\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ (d) $\begin{bmatrix}b & -a\\ d & -c\end{bmatrix}$

5. Let $A=\begin{bmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{bmatrix}$ and $10.B=\begin{bmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{bmatrix}$. If B is the inverse of matrix A, then α is

(a) 5 (b) -1 (c) 2 (d) -2

6. Matrix $A=\begin{bmatrix}1 & 0 & -K\\ 2 & 1 & 3\\ K & 0 & 1\end{bmatrix}$ is invertible for

(a) $K=1$ (b) $K=-1$ (c) $K=0$ (d) All real K

7. Let $f(\alpha)=\begin{bmatrix}\cos\alpha & -\sin\alpha & 0\\ \sin\alpha & \cos\alpha & 0\\ 0 & 0 & 1\end{bmatrix}$, where $\alpha\in R$, then $[f(\alpha)]^{-1}$ is equal to

(a) $f(-\alpha)$ (b) $f(\alpha^{-1})$ (c) $f(2\alpha)$ (d) None

8. If I is a unit matrix of order 10, then the determinant of I is equal to

(a) 10 (b) 1 (c) 1/10 (d) 9

9. If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ and $|A^3|=125$ then $\alpha=$

(a) ± 3 (b) ± 2 (c) ± 5 (d) 0

10. If $|A|$ denotes the value of the determinant of the square matrix A of order 3, then $|-2A|=$

(a) $-8|A|$ (b) $8|A|$ (c) $-2|A|$ (d) None of these

11. The system AX = B of n equations in n unknowns has infinitely many solutions if

(a) det A $\neq 0$ (b) det A = 0, (adjA)B $\neq$ O

(c) det A = 0, (adjA)B = O (d) det A $\neq$ 0, (adjA)B = O

12. If A = $\begin{bmatrix}-2 & 3 & -1\\ -1 & 2 & -1\\ -6 & 9 & -4\end{bmatrix}$ and B = $\begin{bmatrix}1 & 3 & -1\\ 2 & 2 & -1\\ 3 & 0 & -1\end{bmatrix}$, then

(a) A B = B A (b) AB | BA

(c) A B = $\frac{1}{2}$ B A (d) None of these.

13. If A = $\begin{bmatrix}1 & tanx\\ -tanx & 1\end{bmatrix}$, then the value of $|A^TA^{-1}|$ is

(a) cos4x (b) $\sec^2 x$ (c) – cos4x (d) 1

14. If A = $\begin{bmatrix}2 & 3 & 4\\ 5 & -3 & 8\\ 9 & 2 & 16\end{bmatrix}$, then trace of A is,

(a) 17 (b) 25 (c) 8 (d) 15

15. If A is an orthogonal matrix, then

(a) |A| =0 (b) |A|= $\pm$ 1

(c) |A| = $\pm$ 2 (d) None of these.

16. If A = $\begin{bmatrix}2 & -2 & -4\\ -1 & 3 & 4\\ 1 & -2 & x\end{bmatrix}$ is an idempotent matrix then x =

(a) -5 (b) -1 (c) -3 (d) -4

17. If A = $\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 1\\ 0 & -2 & 4\end{bmatrix}$, I = $\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$ and

$A^{-1}=\frac{1}{6}(A^2+cA+d)$ then the values of c and d are respectively -

(a) - 6, - 11 (b) 6, 11 (c) - 6, 11 (d) None of these

18. If A = $\begin{bmatrix}0 & \alpha & \alpha\\ 2\beta & \beta & -\beta\\ \gamma & -\gamma & \gamma\end{bmatrix}$ is an orthogonal matrix, then the number of possible triplets (α, β, γ)

(a) 8 (b) 6 (c) 4 (d) 2

19. The number of solutions of the matrix equation

$A^2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is -

(a) 2 (b) 4 (c) 8 (d) Infinitely many

20. If the matrix M_r is given by $M_r = \begin{bmatrix} r & r-1 \\ r-1 & r \end{bmatrix}$,

$r = 1, 2, 3$ .... Then the value of det (M_1) + det(M_2) + ... + det (M_{2009}) is

(a) 2008 (b) 2009 (c) $(2009)^2$ (d) $(2008)^2$

21. If $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is to be square root of two rowed unit matrix

thenα, β and γ should satisfy the relation

(a) $1 + \alpha^2 + \beta\gamma = 0$ (b) $1 - \alpha^2 - \beta\gamma = 0$

(c) $1 - \alpha^2 + \beta\gamma = 0$ (d) $\alpha^2 - \beta\gamma + 1 = 0$

22. If $A = \begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & 3 \\ -2 & -3 & 0 \end{bmatrix}$, then $A + 2A^T$ equals -

(a) A (b) $-A^T$ (c) A^T (d) $2A^2$

23. If A is matrix of order 3 and $|A| = 2$, then $|\text{adj } A|$ is equal to .

(a) 1 (b) 2 (c) 2^3 (d) 2^2

24. Matrix $[1 \quad 2] \left(\begin{bmatrix} -2 & 5 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} \right)$ is equal to-

(a) [1 2 2] (b) [2 3] (c) [2 2] (d) None of these

25. If w is a complex cube root of unity, then the matrix A =

$\begin{bmatrix} 1 & w^2 & w \\ w^2 & w & 1 \\ w & 1 & w^2 \end{bmatrix}$ is a-

(a) Singular matrix (b) Non-singular matrix

(c) Skew symmetric matrix (d) None of these