JEE MAIN : CHAPTER WISE TEST-4

SUBJECT :- MATHEMATICS **DATE**.....

CLASS :- 12th **NAME**.....

CHAPTER :- MATRICES & DETERMINANTE **SECTION**.....

(SECTION A)

1. In a ΔABC, if $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$, then $\sin^2 A + \sin^2 B + \sin^2 C =$

(A) $\frac{9}{4}$ (B) $\frac{4}{9}$

(C) 1 (D) $3\sqrt{3}$

2. For positive numbers x, y and z the numerical value of the determinant $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$ is

(A) 0 (B) 1

(C) $\log_e xyz$ (D) None of these

3. l, m, n are the p^{th}, q^{th} and r^{th} term of a G.P., all positive, then $\begin{vmatrix} \log l & p & 1 \\ \log m & q & 1 \\ \log n & r & 1 \end{vmatrix}$ equals

(A) –1 (B) 2 (C) 1 (D) 0

4. If

$x^a y^b = e^m, x^c y^d = e^n, \Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}$ $\Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}$

and $\Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$, then the values of *x* and *y* are respectively

(A) Δ_1/Δ_3 and Δ_2/Δ_3

(B) Δ_2/Δ_1 and Δ_3/Δ_1

(C) $\log(\Delta_1/\Delta_3)$ and $\log(\Delta_2/\Delta_3)$

(D) e^{Δ_1/Δ_3} and e^{Δ_2/Δ_3}

5. If a, b, c be positive and not all equal, then the value of the determinant $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ is

(A) *–ve* (B) + *ve*

(C) Depends on a, b, c (D) None of these

6. If $x = cy + bz,\ y = az + cx,\ z = bx + ay$ (where *x*, *y*, *z* are not all zero) have a solution other than $x = 0$, $y = 0$, $z = 0$ then *a*, *b* and *c* are connected by the relation

(A) $a^2 + b^2 + c^2 + 3abc = 0$

(B) $a^2 + b^2 + c^2 + 2abc = 0$

(C) $a^2 + b^2 + c^2 + 2abc = 1$

(D) $a^2 + b^2 + c^2 - bc - ca - ab = 1$

7. 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

8. If the system of equations $ax + y + z = 0$, $x + by + z = 0$ and $x + y + cz = 0$, where $a, b, c \neq 1$, has a non trivial solution, then the value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$ is

(A) – 1 (B) 0

(C) 1 (D) None of these

9. If *A* is a matrix of order 3 and $|A| = 8$, then $|adj\, A|$=

(A) 1 (B) 2 (C) 2^3 (D) 2^6

10. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then $A^2 =$

(A) $\begin{bmatrix} \cos 2\alpha & \sin 2\alpha \\ \sin 2\alpha & \cos 2\alpha \end{bmatrix}$

(B) $\begin{bmatrix} \cos 2\alpha & -\sin 2\alpha \\ \sin 2\alpha & \cos 2\alpha \end{bmatrix}$

(C) $\begin{bmatrix} \cos 2\alpha & \sin 2\alpha \\ -\sin 2\alpha & \cos 2\alpha \end{bmatrix}$

(D) $\begin{bmatrix} -\cos 2\alpha & \sin 2\alpha \\ -\sin 2\alpha & -\cos 2\alpha \end{bmatrix}$

11. If $A = \begin{bmatrix} 1 & 2 & 3 \\ -2 & 3 & -1 \\ 3 & 1 & 2 \end{bmatrix}$ and *I* is a unit matrix of 3^{rd} order, then $(A^2 + 9I)$ equals

(A) 2*A* (B) 4*A*

(C) 6*A* (D) None of these

12. If $A=\begin{bmatrix}1 & \tan\theta/2\\ -\tan\theta/2 & 1\end{bmatrix}$ and $AB=I$, then $B=$

(A) $\cos^2\frac{\theta}{2}.A$ (B) $\cos^2\frac{\theta}{2}.A^T$

(C) $\cos^2\frac{\theta}{2}.I$ (D) None of these

13. If $A=\begin{bmatrix}4 & 2\\ -1 & 1\end{bmatrix}$ and *I* is the identity matrix of order 2, then $(A-2I)(A-3I)=$

(A) *I* (B) *O*

(C) $\begin{bmatrix}1 & 0\\ 0 & 0\end{bmatrix}$ (D) $\begin{bmatrix}0 & 0\\ 0 & 1\end{bmatrix}$

14. If $A=\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & -1\\ 3 & -1 & 1\end{bmatrix}$, then

(A) $A^3+3A^2+A-9I_3=O$

(B) $A^3-3A^2+A+9I_3=O$

(C) $A^3+3A^2-A+9I_3=O$

(D) $A^3-3A^2-A+9I_3=O$

15. If $3X+2Y=I$ and $2X-Y=O$, where *I* and *O* are unit and null matrices of order 3 respectively, then

(A) $X=(1/7),Y=(2/7)$

(B) $X=(2/7),Y=(1/7)$

(C) $X=(1/7)I,Y=(2/7)I$

(D) $X=(2/7)I,Y=(1/7)I$

16. Let $A=\begin{bmatrix}4 & 6 & -1\\ 3 & 0 & 2\\ 1 & -2 & 5\end{bmatrix},B=\begin{bmatrix}2 & 4\\ 0 & 1\\ -1 & 2\end{bmatrix}$ and $C=[3\ 1\ 2]$. The expression which is not defined is

(A) $B'B$ (B) CAB

(C) $A+B'$ (D) A^2+A

17. If *A* is 3×4 matrix and *B* is a matrix such that $A'B$ and BA' are both defined. Then *B* is of the type

(A) 3 × 4 (B) 3 × 3

(C) 4 × 4 (D) 4 × 3

18. If $A=\begin{bmatrix}1\\ 2\\ 3\end{bmatrix}$, then $AA'=$

(A) 14 (B) $\begin{bmatrix}1\\ 4\\ 3\end{bmatrix}$

(C) $\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$ (D) None of these

19. If A',B' are transpose matrices of the square matrices A,B respectively, then $(AB)'$ is equal to

(A) $A'B'$ (B) $B'A'$

(C) AB' (D) BA'

20. If $A=\begin{bmatrix}a & 0 & 0\\ 0 & b & 0\\ 0 & 0 & c\end{bmatrix}$, then $A^n=$

(A) $\begin{bmatrix}na & 0 & 0\\ 0 & nb & 0\\ 0 & 0 & nc\end{bmatrix}$ (B) $\begin{bmatrix}a & 0 & 0\\ 0 & b & 0\\ 0 & 0 & c\end{bmatrix}$

(C) $\begin{bmatrix}a^n & 0 & 0\\ 0 & b^n & 0\\ 0 & 0 & c^n\end{bmatrix}$ (D) None of these

(SECTION B)

21. Let X be the solution set of the equation $A^x = I$, where $A=\begin{bmatrix}0 & 1 & -1\\ 4 & -3 & 4\\ 3 & -3 & 4\end{bmatrix}$ and I is the unit matrix and $X \subset N$ then the minimum value of $\sum_x(\cos^x\theta+\sin^x\theta)$, $\theta \in R$ is :

22. If A is a diagonal matrix of order 3 × 3 is commutative with every square matrix of order 3 × 3 under multiplication and tr(A) = 12, then the value of |A| is :

23. **A,** is a (3×3) diagonal matrix having integral entries such that det(A) = 120, number of such matrices is 10n. Then n is :

24. If $\begin{vmatrix}b+c & c+a & a+b\\ c+a & a+b & b+c\\ a+b & b+c & c+a\end{vmatrix} \geq 0$, where a, b, c $\in R^+$, then $\frac{a+b}{c}$ is

25. If $a_1, a_2, a_3, 5, 4, a_6, a_7, a_8, a_9$ are in H.P. and **D** $=\begin{vmatrix}a_1 & a_2 & a_3\\ 5 & 4 & a_6\\ a_7 & a_8 & a_9\end{vmatrix}$, then the value of **21D** is

26. If $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}$ = $k(\alpha a + \beta b + \gamma c)^3$, then $(2\alpha+\beta-\gamma)^k$ is (α, β, γ, $k \in z^+$)

27. If A is a square matrix of order 3 and A′ denotes transpose of matrix A, A′ A = I and det A = 1, then det (A – I) must be equal to

28. Suppose A is a matrix such that $A^2 = A$ and $(I + A)^6 = I + kA$, then k is

29. If $\begin{vmatrix} -bc & b^2+bc & c^2+bc \\ a^2+ac & -ac & c^2+ac \\ a^2+ab & b^2+ab & -ab \end{vmatrix}$ = 64, then (ab + bc + ac) is :

30. Let f(x) = $\begin{vmatrix} 1+\sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1+\cos^2 x & 4\sin 2x \\ \sin^2 x & \cos^2 x & 1+4\sin 2x \end{vmatrix}$ then the maximum value of f(x) is