

## Topic :- DETERMINANTS

1.  $\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix}$  is equal to

- a)  $\frac{1}{abc}(ab + bc + ca)$       b)  $ab + bc + ca$       c) 0      d)  $a + b + c$

2. If  $a^{-1} + b^{-1} + c^{-1} = 0$  such that  $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = \lambda$  then value of  $\lambda$  is

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

3. If  $a, b, c$ , are in A.P., then the value of

$\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix}$ , is

- a) 3      b)  $-3$       c) 0      d) None of these

4.  $\begin{vmatrix} a-b & b-c & c-a \\ x-y & y-z & z-x \\ p-q & p-r & r-p \end{vmatrix}$  is equal to

- a)  $a(x + y + z) + b(p + q + r) + c$       b) 0  
c)  $abc + xyz + pqr$       d) None of the above

5.  $\begin{vmatrix} a-b+c & -a-b+c & 1 \\ a+b+2c & -a+b+2c & 2 \\ 3c & 3c & 3 \end{vmatrix}$  is

- a)  $6ab$       b)  $ab$       c)  $12ab$       d)  $2ab$

6. In the determinant  $\begin{vmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ 2 & -3 & 0 \end{vmatrix}$ , the value of cofactor to its minor of the element  $-3$  is

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

7. If  $\omega$  is a cube root of unity, then for polynomial is

$\begin{vmatrix} x+1 & \omega & \omega^2 \\ \omega & x+\omega^2 & 1 \\ \omega^2 & 1 & x+\omega \end{vmatrix}$

- a) 1      b)  $\omega$       c)  $\omega^2$       d) 0

8. If  $\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = 0$ , then  $x$  equals

a)  $a + b + c$                       b)  $-(a + b + c)$                       c)  $0, a + b + c$                       d)  $0, -(a + b + c)$

9. If  $a, b, c$  are the sides of a  $\Delta ABC$  and  $A, B, C$  are respectively the angles opposite to them, then

$\begin{vmatrix} a^2 & b \sin A & c \sin A \\ b \sin A & 1 & \cos(B - C) \\ c \sin A & \cos(B - C) & 1 \end{vmatrix}$  equals

- a)  $\sin A - \sin B \sin C$     b)  $abc$                       c)  $1$                       d)  $0$

10. If  $D_r = \begin{vmatrix} 2^{r-1} & 3^{r-1} & 4^{r-1} \\ x & y & z \\ 2^n - 1 & (3^n - 1)/2 & (4^n - 1)/3 \end{vmatrix}$ , then the value of  $\sum_{r=1}^n D_r$  is equal to

- a)  $1$                       b)  $-1$                       c)  $0$                       d) None of these

11. If  $A, B$  and  $C$  are the angles of a triangle and

$\begin{vmatrix} 1 & 1 & 1 \\ 1 + \sin A & 1 + \sin B & \sin C \\ \sin A + \sin^2 A & \sin B + \sin^2 B & \sin C + \sin^2 C \end{vmatrix} = 0$

then the triangle must be

- a) Equilateral                      b) Isosceles                      c) Any triangle                      d) Right angled

12. Let  $A = \begin{bmatrix} 1 & \sin \theta & 1 \\ -\sin \theta & 1 & \sin \theta \\ -1 & -\sin \theta & 1 \end{bmatrix}$ , where  $0 \leq \theta < 2\pi$ . Then, which of the following is not correct?

- a)  $\text{Det}(A) = 0$                       b)  $\text{Det}(A) \in (-\infty, 0)$                       c)  $\text{Det}(A) \in [2, 4]$                       d)  $\text{Det}(A) \in [-2, \infty)$

13.  $\begin{vmatrix} 1 & 5 & \pi \\ \log_e e & 5 & \sqrt{5} \\ \log_{10} 10 & 5 & e \end{vmatrix}$  is equal to

- a)  $\sqrt{\pi}$                       b)  $e$                       c)  $1$                       d)  $0$

14. If  $a^2 + b^2 + c^2 = -2$  and

$f(x) = \begin{vmatrix} 1 + a^2x & (1 + b^2)x & (1 + c^2)x \\ (1 + a^2)x & (1 + b^2)x & (1 + c^2)x \\ (1 + a^2)x & (1 + b^2)x & (1 + c^2)x \end{vmatrix}$ , then  $f(x)$  is a polynomial of degree

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

15. If  $c < 1$  and the system of equations  $x + y - 1 = 0$ ,  $2x - y - c = 0$  and  $-bx + 3by - c = 0$  is consistent, then the possible real values of  $b$  are

- a)  $b \in (-3, \frac{3}{4})$                       b)  $b \in (-\frac{3}{4}, 4)$                       c)  $b \in (-\frac{3}{4}, 3)$                       d) None of these

16. The value of  $\begin{vmatrix} 1 & 1 & 1 \\ (2^x + 2^{-x})^2 & (3^x + 3^{-x})^2 & (5^x + 5^{-x})^2 \\ (2^x - 2^{-x})^2 & (3^x - 3^{-x})^2 & (5^x - 5^{-x})^2 \end{vmatrix}$  is

- a) 0                                      b)  $30^x$                                       c)  $30^{-x}$                                       d) 1

17. If  $A$  is an invertible matrix, then  $\det(A^{-1})$  is equal to

- a)  $\det b(A)$                                       b)  $\frac{1}{\det(A)}$                                       c) 1                                      d) None of these

18. If  $a \neq 0, b \neq 0, c \neq 0$ , then  $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$  is equal to

- a)  $abc$                                       b)  $abc(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c})$                                       c) 0                                      d)  $1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$

19. If  $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$ , then  $f(2x) - f(x)$  is equal to

- a)  $ax$                                       b)  $ax(2a + 3x)$                                       c)  $ax(2 + 3x)$                                       d) None of these

20. If  $\begin{vmatrix} -12 & 0 & \lambda \\ 0 & 2 & -1 \\ 2 & 1 & 15 \end{vmatrix} = -360$ , then the value of  $\lambda$  is

- a) -1                                      b) -2                                      c) -3                                      d) 4

