DETERMINANT

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

(a) 0 (b) *abc* (c) –*abc* (d) None of these

2. The value of the determinant $\Delta = \begin{vmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{vmatrix}$ is equal to

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

3. If $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = \lambda a^2 b^2 c^2$ then the value of λ is

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

4. If $a > 0$ and discriminant of $ax^2 + 2bx + c$ is negative, then $\begin{vmatrix} a & b & ax+b \\ b & c & bx+c \\ ax+b & bx+c & 0 \end{vmatrix}$ is

(a) Positive (b) $(ac-b^2)(ax^2+2bx+c)$ (c) Negative (d) 0

5. The determinant $\Delta = \begin{vmatrix} a & b & ax+b \\ b & c & bx+c \\ ax+b & bx+c & 0 \end{vmatrix} = 0$, if *a, b, c* are in

(a) *A.P.* (b) *G.P.* (c) *H.P.* (d) None of these

6. The value of the determinant $\begin{vmatrix} 1 & \cos(\alpha-\beta) & \cos\alpha \\ \cos(\alpha-\beta) & 1 & \cos\beta \\ \cos\alpha & \cos\beta & 1 \end{vmatrix}$ is

(a) $\alpha^2+\beta^2$ (b) $\alpha^2-\beta^2$ (c) 1 (d) 0

7. 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) $3\sqrt{3}$

8. The solution set of the equation $\begin{vmatrix} 2 & 3 & m \\ 2 & 1 & m^2 \\ 6 & 7 & 3 \end{vmatrix} = 0$ is

(a) (1, 2) (b) (1, –2) (c) (1, –3) (d) (0, 1)

9. If *a, b, c* are in A.P., then the value of $\begin{vmatrix} x+2 & x+3 & x+a \\ x+4 & x+5 & x+b \\ x+6 & x+7 & x+c \end{vmatrix}$ is

(a) $x-(a+b+c)$ (b) $9x^2+a+b+c$ (c) $(a+b+c)$ (d) 0

10. The value of *x* obtained from the equation $\begin{vmatrix} x+\alpha & \beta & \gamma \\ \gamma & x+\beta & \alpha \\ \alpha & \beta & x+\gamma \end{vmatrix} = 0$ will be

(a) 0 and $-(\alpha+\beta+\gamma)$ (b) 0 and $(\alpha+\beta+\gamma)$ (c) 1 and $(\alpha-\beta-\gamma)$ (d) 0 and $(\alpha^2+\beta^2+\gamma^2)$

11. If $ab+bc+ca=0$ and $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$, then one of the value of *x* is

(a) $(a^2+b^2+c^2)^{\frac{1}{2}}$ (b) $\left[\frac{3}{2}(a^2+b^2+c^2)\right]^{\frac{1}{2}}$ (c) $\left[\frac{1}{2}(a^2+b^2+c^2)\right]^{\frac{1}{2}}$ (d) None of these

12. If $\Delta_1 = \begin{vmatrix} 7 & x & 2 \\ -5 & x+1 & 3 \\ 4 & x & 7 \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} x & 2 & 7 \\ x+1 & 3 & -5 \\ x & 7 & 4 \end{vmatrix}$ then $\Delta_1 - \Delta_2 = 0$ for

(a) $x = 2$ (b) All real x (c) $x = 0$ (d) None of these

13. If $\Delta_1 = \begin{vmatrix} x-y-z & 2x & 2x \\ 2y & y-z-x & 2y \\ 2z & 2z & z-x-y \end{vmatrix}$ and $\Delta_2 = \begin{vmatrix} x+y+2z & x & y \\ z & y+z+2x & y \\ z & x & z+x+2y \end{vmatrix}$, then

(a) $\Delta_1 = 2\Delta_2$ (b) $\Delta_2 = 2\Delta_1$ (c) $\Delta_1 = \Delta_2$ (d) None of these

14. Consider the following statements with reference to determinants

(I) The value of determinant is unchanged if the rows and columns are interchanged

(II) If any two rows or columns of a determinant are interchanged, the sign of the determinant is changed.

(III) If any two rows or columns are identical, the value of determinant is zero

(a) I and III are correct (b) II and III are correct (c) Only I is correct (d) I, II and III are correct

15. Let a_{ij} denote the element of the i^{th} row and j^{th} column in a 3×3 determinant ($1 \le i \le 3$, $1 \le j \le 3$) and let $a_{ij} = -a_{ji}$ for every *i* and *j*. Then the determinant has all the principal diagonal elements as

(a) 1 (b) –1 (c) 0 (d) None of these