1. If the determinant

$$\begin{vmatrix} b-c & c-a & a-b \\ b'-c' & c'-a' & a'-b' \\ b''-c'' & c''-a'' & a''-b'' \end{vmatrix} = m\begin{vmatrix} a & b & c \\ a' & b' & c' \\ a'' & b'' & c'' \end{vmatrix}$$

then value of m is -

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

2. If $\begin{vmatrix} x^3+4x & x+3 & x-2 \\ x-2 & 5x & x-1 \\ x-3 & x+2 & 4x \end{vmatrix} = ax^5+bx^4+cx^3+dx^2+ex+f$

be an identity in x, where a, b, c, d, e, f are independent of x, then the value of f is -

(a) 0 (b) 15 (c) 17 (d) None of these

3. If $D = \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $D' = \begin{vmatrix} a_1+pb_1 & b_1+qc_1 & c_1+ra_1 \\ a_2+pb_2 & b_2+qc_2 & c_2+ra_2 \\ a_3+pb_3 & b_3+qc_3 & c_3+ra_3 \end{vmatrix}$

then

(a) D′ = D(1 + pqr) (b) D′ = D

(c) D′ = D(1 - pqr) (d) D′ = D(1 + p + q + r)

4. If [.] denotes the greatest integer less than or equal to the real number under consideration, and $-1 \le x < 0$; $0 \le y < 1$; $1 \le z < 2$, then the value of determinant $\begin{vmatrix} [x]+1 & [y] & [z] \\ [x] & [y]+1 & [z] \\ [x] & [y] & [z]+1 \end{vmatrix}$ is

(a) [x] (b) [y] (c) [z] (d) None of these

5. The value of third order determinant is 11, then the value of the square of determinant formed by the cofactors will be :

(a) 11 (b) 121 (c) 1331 (d) 14641

6. The roots of the equation $\begin{vmatrix} x & \alpha & 1 \\ \beta & x & 1 \\ \beta & \gamma & 1 \end{vmatrix} = 0$ are independent of -

(a) α (b) β (c) γ (d) All of these

7. If the determinant $\begin{vmatrix} \cos 2x & \sin^2 x & \cos 4x \\ \sin^2 x & \cos 2x & \cos^2 x \\ \cos 4x & \cos^2 x & \cos 2x \end{vmatrix}$ is expended in power of sin x. Then the constant term in the expansion is -

(a) 1 (b) 2 (c) -1 (d) None of these

8. If $\begin{vmatrix} a^n & a^{n+1} & a^{n+2} \\ b^n & b^{n+1} & b^{n+2} \\ c^n & c^{n+1} & c^{n+2} \end{vmatrix}$ = (a - b) (b - c) (c - a), then n is equal to

(a) n =1 (b) n = 2 (c) Any value of n (d) None of these

9. If $\begin{vmatrix} x+\alpha & \beta & \gamma \\ \alpha & x+\beta & \gamma \\ \alpha & \beta & x+\gamma \end{vmatrix} = 0$, then x is equal to

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

(c) 0, $-(\alpha+\beta+\gamma)$ (d) 0, $(\alpha+\beta+\gamma)$

10. Let $\Delta = \begin{vmatrix} x^2+4x+5 & x+2 & 5 \\ 2x^2+6x+10 & 2x+3 & 10 \\ 4x^2-2x+20 & 4x-1 & 20 \end{vmatrix}$, then

(a) y = Δ represents a parabola passing through the origin

(b) y = Δ represents a straight line through the origin

(c) Δ = 0 has only one real root

(d) Δ = 0 has two distinct real roots

11. If a + b + c > 0 and $\Delta = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$, then

(a) Δ< 0 (b) Δ≤ 0 (c) Δ> 0 (d) Δ = 0

12. If $A^2 + A - I = 0$, then $A^{-1} =$

(a) $A - I$ (b) $I - A$ (c) $I + A$ (d) None of these

13. If the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & \lambda \end{bmatrix}$ is singular, then λ =

(a) 3 (b) 4 (c) 2 (d) 5

14. If A is a 3 x 3 matrix and det $(3A) = k\{\det(A)\}$, k =

(a) 9 (b) 6 (c) 1 (d) 27

15. If α, β are non real numbers satisfying $x^3 - 1 = 0$ then the value of $\begin{vmatrix} \lambda+1 & \alpha & \beta \\ \alpha & \lambda+\beta & 1 \\ \beta & 1 & \lambda+\alpha \end{vmatrix}$ is equal to

(a) 0 (b) λ^3 (c) λ^3+1 (d) λ^3-1

16. If $\Delta(x) = \begin{vmatrix} x & 1+x^2 & x^3 \\ \log(1+x^2) & e^x & \sin x \\ \cos x & \tan x & \sin^2 x \end{vmatrix}$, then

(a) $\Delta(x)$ is divisible by x (b) $\Delta(x) = 0$

(c) $\Delta'(x) = 0$ (d) None of these.

17. Using the factor theorem it is found that b+c, c+a and a+b are three factors of the determinant $\begin{vmatrix} -2a & a+b & a+c \\ b+a & -2b & b+c \\ c+a & c+b & -2c \end{vmatrix}$.
The other factor in the value of the determinant is
(a) 4 (b) 2 (c) a+b+c (d) None of these

18. If $f(x)=\begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & x(x+1) \\ 3x(x-1) & x(x-1)(x-2) & x(x^2-1) \end{vmatrix}$ then f(200) is equal to
(a) 1 (b) 0 (c) 200 (d) -200

19. $\begin{vmatrix} x+1 & x+2 & x+\lambda \\ x+2 & x+3 & x+\mu \\ x+3 & x+4 & x+\nu \end{vmatrix}=0$, λ,μ,ν are in A. P. is
(a) An equation whose all roots are real
(b) An identity in x
(c) An equation with only one real root
(d) None of these

20. If $f(x)=\begin{vmatrix} x & \cos x & e^{x^2} \\ \sin x & x^2 & \sec x \\ \tan x & 1 & 2 \end{vmatrix}$ then the value of $\int_{-\pi/2}^{\pi/2} f(x)dx$ is equal to
(a) 5 (b) 3 (c) 1 (d) 0

21. If a,b,c are non zero real numbers and if the equations
$(a-1)x = y+z,\ (b-1)y = z+x,\ (c-1)z = x+y$
has a non trivial solution then $ab+bc+ca$ equals.
(a) $a+b+c$ (b) abc (c) 1 (d) None of these

22. If α, β, γ are the roots of $x^3 + ax^2 + b = 0$, then the determinant $\Delta = \begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}$ equals:
(a) $-a^3$ (b) $a^3 - 3b$ (c) $a^2 - 3b$ (d) a^3

23. If the system of equations
$x + ay + az = 0$
$bx + y + bz = 0$
$cx + cy + z = 0$
where a, b and c are non-zero and non-unity, has a non-trivial solution, then the value of $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c}$ is -
(a) Zero (b) 1 (c) - 1 (d) $\frac{abc}{a^2+b^2+c^2}$

24. If a, b, c are non-zero no.'s, then $\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & ab & a+b \end{vmatrix}$ is equal to -
(a) abc (b) $a^2b^2c^2$ (c) ab + bc + ca (d) None of these

25. If the system of linear equations
$x + 2ay + az = 0$
$x + 3by + bz = 0$
$x + 4cy + cz = 0$
has a non zero solutions, then a, b, c are in
(a) A.P. (b) G.P.
(c) H.P (d) Satisfies a + 2b + 3c = 0