1. If α be a repeated roots of the quadratic equation $f(x) = 0$ and A(x), B(x), C(x) are polynomials of degree 3, 4, 5 respectively then determinant $\begin{vmatrix} A(x) & B(x) & C(x) \\ A(\alpha) & B(\alpha) & C(\alpha) \\ A'(\alpha) & B'(\alpha) & C'(\alpha) \end{vmatrix}$ is divisible by (where $A'(\alpha) = \left(\frac{dA}{dx}\right)_{x=\alpha}$, etc) -

(a) $f(x)(x-\alpha)^3$ (b) $(f(x))^2$ (c) $f(x)$ (d) None of these

2. If $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = \lambda a^2b^2c^2$, Then λ =

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

3. If a, b, c are in AP; Then value of $\begin{vmatrix} 1 & 2 & a \\ 2 & 3 & b \\ 3 & 4 & c \end{vmatrix}$ is -

(a) a + c (b) 2 (a + c) (c) b (d) None

4. The value of

$\Delta = \begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix}$ is equal to -

(a) $9a^2(a+b)$ (b) $9b^2(a+b)$ (c) $a^2(a+b)$ (d) $b^2(a+b)$

5. If $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = \lambda a^2b^2c^2$, Then λ =

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

6. 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) +ive (b) -ive (c) Depends on a, b, c (d) None

7. The value of the determinant $\begin{vmatrix} \lfloor 10 & \lfloor 11 & \lfloor 12 \\ \lfloor 11 & \lfloor 12 & \lfloor 13 \\ \lfloor 12 & \lfloor 13 & \lfloor 14 \end{vmatrix}$ is

(a) $2(\lfloor 10 \lfloor 11)$ (b) $2(\lfloor 10 \lfloor 13)$

(c) $2(\lfloor 10 \lfloor 11 \lfloor 12)$ (d) $2(\lfloor 11 \lfloor 12 \lfloor 13)$

8. Consider the system of linear equation in x, y and z

$(\sin 3\theta)x - y + z = 0$

$(\cos 2\theta)x + 4y + 3z = 0$

$2x + 7y + 7z = 0$

If the system has non-trivial solution, then $\theta \in [0, \pi]$ are -

(a) 0, π, $\pi/6$ (b) 0, π, $\pi/6$, $5\pi/6$

(c) 0, $\pi/6$, $5\pi/6$ (d) None

9. If $f(x) = \begin{vmatrix} 2^{-x} & e^{x\log_e 2} & x^2 \\ 2^{-3x} & e^{3x\log_e 2} & x^4 \\ 2^{-5x} & e^{5x\log_e 2} & 1 \end{vmatrix}$ Then

(a) f(x) + f(-x) = 0 (b) f(x) - f(-x) = 0

(c) f(x) + f(-x) = 2 (d) None of these

10. If 2^{a_1}, 2^{a_2}, 2^{a_3} ..... 2^{a_n} are in G.P. Then $\begin{vmatrix} a_1 & a_2 & a_3 \\ a_{n+1} & a_{n+2} & a_{n+3} \\ a_{2n+1} & a_{2n+2} & a_{2n+3} \end{vmatrix}$ is equal to

(a) 2 (b) 2^3 (c) 0 (d) None of these

11. If p + q + r = 0 = a + b + c, Then the value of the determinant $\begin{vmatrix} pa & qb & rc \\ qc & ra & pb \\ rb & pc & qa \end{vmatrix}$ is

(a) 0 (b) pa + qb + rc (c) 1 (d) None of these

12. In triangle ABC, $z = \begin{vmatrix} e^{-2iA} & e^{+ic} & e^{iB} \\ e^{iC} & e^{-i2B} & e^{iA} \\ e^{iB} & e^{iA} & e^{-i2C} \end{vmatrix}$ where $i = \sqrt{-1}$.

Then arg(z) =

(a) 0 (b) Does not exist (c) π (d) None of these

13. Consider the system of linear equation in x, y and z

$(\sin 3\theta)x - y + z = 0$

$(\cos 2\theta)x + 4y + 3z = 0$

$2x + 7y + 7z = 0$

if the system has non trivial solution, then $\theta \in [0, \pi]$ are

(a) $0, \pi, \frac{\pi}{6}$ (b) $0, \frac{\pi}{6}, \frac{5\pi}{6}$

(c) $0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$ (d) None of these

14. $\begin{vmatrix} 18 & 40 & 89 \\ 40 & 89 & 198 \\ 89 & 198 & 440 \end{vmatrix}$ =

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

15. The value of 'λ' if $ax^4 + bx^3 + cx^2 + 50x + d$

$= \begin{vmatrix} x^3-14x^2 & -x & 3x+\lambda \\ 4x+1 & 3x & x-4 \\ -3 & 4 & 0 \end{vmatrix}$ is

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

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

(a) a (2a + 3x) (b) ax (2a + 3x)
(c) ax (2x + 3a) (d) x (2a + 3x)

17. If $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix} = mb^n (a+b)$, then

(a) m = 9, n = 1 (b) m = 1, n = 2
(c) m = 9, n = 2 (d) None of these

18. If the value of a third order determinant is 11, then the value of the determinant formed by its cofactors will be

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

19. $\begin{vmatrix} a+b & a+2b & a+3b \\ a+2b & a+3b & a+4b \\ a+4b & a+5b & a+6b \end{vmatrix} =$

(a) $a^3+b^3+c^3$ (b) 0
(c) $a^3+b^3+c^3-3abc$ (d) None of these

20. 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, $(\alpha+\beta+\gamma)$

21. If x, y, z are integers in A.P., lying between 1 and 9, and x51, y41 and z31 are three digit numbers then the value of

$\begin{vmatrix} 5 & 4 & 3 \\ x51 & y41 & z31 \\ x & y & z \end{vmatrix}$ is

(a) x + y + z (b) 0 (c) x - y + z (d) x - y - z

22. The value of $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ bc & ca & ab \\ b+c & c+a & a+b \end{vmatrix}$ is -

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

23. For positive numbers x, y , 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) 2 (d) None of these

24. If α, β, γ are the roots of the equation $x^3 + px + q = 0$ then the value of $\begin{vmatrix} \alpha & \beta & \gamma \\ \beta & \gamma & \alpha \\ \gamma & \alpha & \beta \end{vmatrix}$ is -

(a) q (b) 0 (c) p (d) $p^2 - 2q$

25. The value of determinant $\begin{vmatrix} \sin^2 13 & \sin^2 77 & \tan 135 \\ \sin^2 77 & \tan 135 & \sin^2 13 \\ \tan 135 & \sin^2 13 & \sin^2 77 \end{vmatrix}$ is -

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