MATHEMATICS

1. If A and B are square matrices of order 3 such that $|A| = -1$, $|B|=3$, then $|3AB| =$

1) -9 2) -27 3) -81 4) 81

MATHEMATICS

We know that

$$|KA| = K^n |A| \text{ If A is } n^{th} \text{ Order}$$

$$|3AB| = 3^3 |A|.|B| = 27(-1)(3) = -81$$

$$\therefore \textit{Answer is } (3)$$

MATHEMATICS

2. If A= $\begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 1 & 0 & 2 \end{pmatrix}$ then |adj A| = 1)9 2) 1/9 3) 81 4) 0

MATHEMATICS

$$|A| = 2(4-0) - 1(0-1) + 0$$

$= 8 + 1 = 9$

If A is square matrix of order n, then

$$|\mathrm{adj}A| = |A|^{n-1}$$

$$|\mathrm{adj}A| = |A|^{3-1} = |A|^2 = 9^2 = 81$$

$$\therefore \textit{Answer is } (3)$$

3. The sum of $\begin{pmatrix} 2 & -3 \\ 5 & -7 \end{pmatrix}$ and its multiplicative inverse is

1) $\begin{pmatrix} 4 & -6 \\ 10 & 14 \end{pmatrix}$ 2) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ 3) $\begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix}$ 4) $\begin{pmatrix} -5 & 0 \\ 0 & -5 \end{pmatrix}$

MATHEMATICS

The Sum of $\begin{bmatrix} 2 & -3 \\ 5 & -7 \end{bmatrix}$ *and multiplicative inverse is* $\begin{bmatrix} 2 & -3 \\ 5 & -7 \end{bmatrix} + \begin{bmatrix} -7 & 3 \\ -5 & 2 \end{bmatrix} = \begin{bmatrix} -5 & 0 \\ 0 & -5 \end{bmatrix}$

$\therefore$ *Answer is* (4)

MATHEMATICS

4.

$$If\ \Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}\ \&\ \Delta_2 = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix}\ then$$

1) $\Delta_1 + \Delta_2 = 0$ 2) $\Delta_1 = \Delta_2$

3) $\Delta_1 + 2\Delta_2 = 0$ 4) $None$

MATHEMATICS

$$\Delta_2 = \begin{vmatrix} 1 & bc & a \\ 1 & ca & b \\ 1 & ab & c \end{vmatrix} = \frac{1}{abc}\begin{vmatrix} a & abc & a^2 \\ b & abc & b^2 \\ c & abc & c^2 \end{vmatrix}$$

$$= \frac{abc}{abc}\begin{vmatrix} a & 1 & a^2 \\ b & 1 & b^2 \\ c & 1 & c^2 \end{vmatrix} = -1\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$

$$= -1\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = -\Delta_1$$

$\therefore$ *Answer is* (1)

MATHEMATICS

5. $\begin{vmatrix} b^2c^2 & bc & b+c \\ c^2a^2 & ca & c+a \\ a^2b^2 & bc & a+b \end{vmatrix} =$

1) a+b+c 2) 0 3) ab + bc+ ca 4) 1/abc.(ab + bc+ca)

MATHEMATICS

Multiply and divide R_1 by a, R_2 by b, R_3 by c

$$\frac{1}{abc}\begin{vmatrix} ab^2c^2 & abc & ab+ac \\ bc^2a^2 & abc & bc+ba \\ ca^2b^2 & abc & ca+cb \end{vmatrix}$$

$$= \frac{(abc)^2}{abc}\begin{vmatrix} 1 & 1 & ab+ac \\ 1 & 1 & bc+ab \\ 1 & 1 & ca+cb \end{vmatrix} = 0$$

$\therefore Answer\ is\ (2)$

MATHEMATICS

6. If $A = \begin{pmatrix} 100 & 50 \\ 50 & 100 \end{pmatrix}$ $B = \begin{pmatrix} 200 & 300 \\ 100 & 200 \end{pmatrix}$ Then $|AB| =$

1) $175x10^4$ 2) $175x10^6$ 3) $175x10^3$ 4) 0

MATHEMATICS

$$|A| = 50\ x\ 50 \begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix} = 2500\ x\ 7 = 17500$$

$$|B| = 100\ x\ 100 \begin{vmatrix} 2 & 3 \\ 1 & 2 \end{vmatrix} = 10000\ x\ 1 = 10000$$

$$then\ |AB| = |A||B| = 17500x\ 10000 = 175x10^6$$

$$\therefore Answer\ is\ (2)$$

MATHEMATICS

7. In a Δ ABC,

$$\begin{vmatrix} 1 & \text{Sin A} & \text{Sin}^2\text{A} \\ 1 & \text{SinB} & \text{Sin}^2\text{B} \\ 1 & \text{SinC} & \text{Sin}^2\text{C} \end{vmatrix} = 0$$

1) Right angled 2)Right angled isosceles 3) Isosceles 4) Equilateral

MATHEMATICS

$$\begin{vmatrix} 1 & sinA & Sin^2A \\ 1 & sinB & Sin^2B \\ 1 & sinC & Sin^2C \end{vmatrix} = 0$$

$$\frac{R_2 - R_1}{R_3 - R_1} \begin{vmatrix} 1 & sinA & Sin^2A \\ 0 & sinB - sinA & Sin^2B - Sin^2A \\ 0 & sinC - sinA & Sin^2C - Sin^2A \end{vmatrix} = 0$$

$$(sinA - sinB)(sinC - sinA)(sinC - sinB) = 0$$

$$SinA = sinB \rightarrow A = B \; or \; B = C \; or \; C = A$$

$\therefore$ *Answer is* (3)

MATHEMATICS

8. If $\alpha = \begin{vmatrix} 1 & x & yz \\ 1 & y & zx \\ 1 & z & xy \end{vmatrix}$ and $\beta = \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$ Then

1) $\alpha \neq \beta$ 2) $\alpha = \beta$ 3) $\alpha = 2\beta$ 4) $\alpha = -\beta$

MATHEMATICS

$$\alpha = \frac{1}{xyz}\begin{vmatrix} x & x^2 & xyz \\ y & y^2 & xyz \\ z & z^2 & xyz \end{vmatrix}$$

$$= \frac{xyz}{xyz}\begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} \; By\ theorem - 2$$

$$= \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = \beta$$

$\therefore$ *Answer is (2)*

MATHEMATICS

9. $\begin{vmatrix} 1/a & a^2 & bc \\ 1/b & b^2 & ca \\ 1/c & c^2 & ab \end{vmatrix}$

1) 0 2) 1 3) -1 4) abc

$Multiply\ and\ Divide\ R_1\ by\ a\ R_2\ by\ b\ R_3\ by\ c$

$$\frac{1}{abc}\begin{vmatrix}1 & a^3 & abc\\1 & b^3 & abc\\1 & c^3 & abc\end{vmatrix}$$

$$\frac{abc}{abc}\begin{vmatrix}1 & a^3 & 1\\1 & b^3 & 1\\1 & c^3 & 1\end{vmatrix} = 0$$

$\therefore\ Answer\ is\ (1)$

MATHEMATICS

10. Let $\begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix} = x + iy$ then $(x, y) =$

1) (0, 1) 2) (0, 0) 3) (1, 0) 4) (1, 1)

MATHEMATICS

$$-3i\begin{vmatrix} 6i & 1 & 1 \\ 4 & -1 & -1 \\ 20 & i & i \end{vmatrix} = 0 \ By\ theorem\ NO\ 3$$

x+iy = 0+i0 then (x,y) = (0,0)

$\therefore Answer\ is\ (2)$

MATHEMATICS

11. If $A = \begin{pmatrix} 4 & 2 \\ -1 & 1 \end{pmatrix}$ then $(A-2I)(A-3I) =$

1) A 2) I 3) 0 4) 5I

MATHEMATICS

$$(A-2I)(A-3I) = \begin{bmatrix} 2 & 2 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -1 & -2 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = 0$$

$\therefore$ *Answer is* (3)

MATHEMATICS

12. Let $W = -\frac{1}{2} + i\sqrt{3}/2$ Then $\Delta = \begin{vmatrix} 1 & 1 & 1 \\ 1 & -1-w^2 & w^2 \\ 1 & w^2 & w^4 \end{vmatrix} =$

1) $3w$ 2) $3w(w-1)$ 3) $3w^2$ 4) $3w(1-w)$

MATHEMATICS

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 & \omega & \omega^2 \\ 1 & \omega^2 & \omega \end{vmatrix} = 1(\omega^2 - \omega) - 1(\omega - \omega^2) + 1(\omega^2 - \omega)$$

$$= \omega^2 - \omega - \omega + \omega^2 + \omega^2 - \omega$$

$$= 3\omega^2 - 3\omega$$

$$= 3\omega(\omega - 1)$$

$$\therefore Answer\ is\ (2)$$

MATHEMATICS

13. If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and a,b,c are distinct, then product abc =

1) 2 2) -1 3) 1 4) 0

MATHEMATICS

$$\begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix} + \begin{vmatrix} a & a^2 & a^3 \\ b & b^2 & b^3 \\ c & c^2 & c^3 \end{vmatrix} = 0$$

$(1+abc)[(a-b)(b-c)(c-a)] = 0$

$abc = -1 \; where \; a, b, c \; are \; distinct$

$\therefore Answer \; is \; (2)$

MATHEMATICS

14. If $A = \begin{pmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}$ then $|adjA| =$

1) a^3 2) a^6 a^9 4) a^{27}

MATHEMATICS

$if\ |adjA| = |A|^{n-1}\ if\ order\ is\ n$

$|A| = a^3$

$|adjA| = |A|^{3-1} = |A|^2 = (a^3)^2 = a^6$

$\therefore\ Answer\ is\ (2)$

MATHEMATICS

15. $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix}^2 = \begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ac & bc & a^2+b^2 \end{vmatrix}$

1) $4abc$ 2) $4a^2b^2c^2$ 3) $a^2b^2c^2$ 4) 0

MATHEMATICS

$$[o - c(0 - ab) + b(ca - o)]^2$$

$$(2abc)^2 = 4a^2b^2c^2$$

$$\therefore Answer\ is\ (2)$$

MATHEMATICS

16. $\begin{vmatrix} 4\sin^2\theta & \cos 2\theta \\ -\cos 2\theta & \cos^2\theta \end{vmatrix} =$

1) -1 2) 0 3) 1 4) $\cos 4\theta$

MATHEMATICS

$$4sin^2\theta.cos^2\theta + cos^2 2\theta$$

$$= (2sin\theta.cos\theta)^2 + cos^2 2\theta$$

$$= sin^2 2\theta + cos^2 2\theta = 1$$

$\therefore$ *Answer is (3)*

MATHEMATICS

17. The roots of the equation $\begin{vmatrix} 2+x & 3 & -4 \\ 2 & 3+x & -4 \\ 2 & 3 & -4+x \end{vmatrix} = 0$

1) 0, 1 2) -2 3) 0, -1 4) -20

MATHEMATICS

We know that

$$\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = x^2(x+a+b+c)$$

Then

$$\begin{vmatrix} 2+x & 3 & -4 \\ 2 & x+3 & -4 \\ 2 & 3 & x-4 \end{vmatrix} = 0$$

$$x^2(x+2+3-4) = 0$$

$$x = 0, x = -1$$

$$\therefore Answer\ is\ (3)$$

MATHEMATICS

18. $\begin{vmatrix} 8579 & 8589 \\ 8581 & 8591 \end{vmatrix} =$

1) 2 2) -2 3) 20 4) -20

MATHEMATICS

$$c_2 - c_1 \begin{vmatrix} 8579 & 10 \\ 8581 & 10 \end{vmatrix} = 10(8579 - 8581)$$

$$= 10(-2)$$

$$= -20$$

$$\therefore \textit{Answer is } (4)$$

MATHEMATICS

19 .If $\begin{pmatrix} 1 & 2 \\ x^3 & y \end{pmatrix} + \begin{pmatrix} 3 & 4 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} a & b \\ 2 & 1 \end{pmatrix}$ then $a + b + x + y =$

1) 5 2) 20 3) -10 4) 0

MATHEMATICS

$$\begin{bmatrix} 1+3 & 2+4 \\ x^3+1 & y+2 \end{bmatrix} = \begin{bmatrix} a & b \\ 2 & 1 \end{bmatrix}$$

$x^3 + 1 = 2$ $\qquad$ $y + 2 = 1$

$x^3 = 1 => x = 1$ $\qquad$ $y = -1$

a = 4 $\qquad$ b = 6

Then a+b+x+y = 10

$\therefore Answer\ is\ (4)$

MATHEMATICS

20. $\begin{vmatrix} 1 & 1+i+w^2 & w^2 \\ 1-i & -1 & w^2-1 \\ -i & -i+w-1 & -1 \end{vmatrix} =$ $w \neq 1$, $w^3=1$ is

1) 1 2) -1 3) 6 4) None

MATHEMATICS

$$R_1 + R_3 = \begin{vmatrix} 1-i & \omega+\omega^2 & \omega^2-1 \\ 1-i & -1 & \omega^2-1 \\ -i & -i+\omega-1 & -1 \end{vmatrix}$$

$$= \begin{vmatrix} 1-i & -1 & \omega^2-1 \\ 1-i & -1 & \omega^2-1 \\ -i & -i+\omega-1 & -1 \end{vmatrix}$$

$= 0$ *By theorem No* 2

$\therefore$ *Answer is* (4)

MATHEMATICS

21. Cofactor of 200 in $\begin{pmatrix} 420 & 429 & 430 \\ 421 & 430 & 800 \\ 900 & 100 & 200 \end{pmatrix}$ is

1) 9 2) -9 3) 6 4) -6

MATHEMATICS

$$Cofactor\ of\ 200\ is + \begin{vmatrix} 420 & 429 \\ 421 & 430 \end{vmatrix} => R_2 - R_1$$

$$\begin{vmatrix} 420 & 429 \\ 1 & 1 \end{vmatrix} = 420 - 429 = -9$$

$$\therefore Answer\ is\ (2)$$

MATHEMATICS

22. $A = \begin{pmatrix} 2 & 0 & 1 \\ 1 & 1 & 0 \\ 2 & 1 & 1 \end{pmatrix}$ and adj $A = \begin{pmatrix} 1 & 2 & -1 \\ x & y & z \\ -1 & -2 & 2 \end{pmatrix}$ then $(x, y, z) =$

1) (-1, 0 -1) 2) (-1, 0, 1) 3) (0, 1, -1) 4) (-1, -1, 1)

MATHEMATICS

$$If\ A = \begin{bmatrix} 2 & 0 & 1 \\ 1 & 1 & 0 \\ 2 & 1 & 1 \end{bmatrix}\ and\ AdjA \begin{bmatrix} 1 & 2 & -1 \\ x & y & z \\ -1 & -2 & 2 \end{bmatrix}$$

$$Then\ (x.y,z) = (-1,0,1)$$

$$x = -(1-0) = -1$$

$$y = +(2-2) = 0$$

$$z = -(0-1) = 1$$

$$\therefore\ Answer\ is\ (2)$$

MATHEMATICS

23. If the matrix $\begin{pmatrix} \lambda & -3 & 4 \\ -3 & 0 & 1 \\ -1 & 3 & 2 \end{pmatrix}$ is invertible then λ =

1) -15 2) -16 3) -17 4) 17

MATHEMATICS

$By\ definition\ of\ singular\ matrix$

$$\begin{vmatrix} \lambda & -3 & 4 \\ -3 & 0 & 1 \\ -1 & 3 & 2 \end{vmatrix} = 0$$

$$\lambda(0-3) + 3(-6+1) + 4(-9-0) = 0$$

$$-3\lambda = 51. \therefore \lambda = -17$$

$\therefore Answer\ is\ (3)$

MATHEMATICS

24. If the matrix $AB = \begin{pmatrix} 4 & 11 \\ 4 & 5 \end{pmatrix}$ and $A = \begin{pmatrix} 3 & 2 \\ 1 & 2 \end{pmatrix}$

Then $|B| =$ 1) -6 2) -11 3) -7/2 4) 4

MATHEMATICS

$We\ know\ that\ |AB| = |A||B|$

$$\begin{vmatrix} 4 & 11 \\ 4 & 5 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 1 & 2 \end{vmatrix} |B|$$

$$(20 - 44) = (6 - 2)|B|$$

$$-24 = 4|B|$$

$$\therefore\ |B| = -6$$

$\therefore\ Answer\ is\ (1)$

MATHEMATICS

25. If the three linear equations $x+4ay+az=0$, $x+3by+bz=0$ and $x+2cy+cz=0$ have a non-trivial solutions, then a,b,c are in

1) A.P. 2) G.P. 3) H.P 4) none

MATHEMATICS

By Property

$$\begin{vmatrix} 1 & 4a & a \\ 1 & 3b & b \\ 1 & 2c & c \end{vmatrix} = 0$$

1(3bc-2bc)-4a(c-b)+a(2c-3b) = 0

bc-4ca-4ab+2ac-3ab=0

There fore b = $\frac{2ac}{a+c}$ hence a,b,c are in HP

$\therefore Answer\ is\ (3)$

MATHEMATICS

26. The Value of λ for which the following system of equations does not have a solution

$x + y + z = 6,$

$4x + \lambda y + \lambda z = 0$

$3x + 2y - 4z = -8$

1) 3 2) -3 3) 0 4) 4

MATHEMATICS

By properties

$$If \begin{vmatrix} 1 & 1 & 1 \\ 4 & \lambda & \lambda \\ 3 & 2 & -4 \end{vmatrix} = 0$$

$1(-4\lambda - 2\lambda) -1(-16-3\lambda) + 1(8-3\lambda) = 0$

$-6\lambda=-24.$

$\therefore \ \lambda = 4 \ Answer\ is\ (4)$

MATHEMATICS

27. If a_1, a_2 .... Form a G.P. $a_i > 0, \forall i \geq 1$

Then $$\begin{vmatrix} \log a_m & \log a_{m+1} & \log a_{m+2} \\ \log a_{m+3} & \log a_{m+4} & \log a_{m+5} \\ \log a_{m+6} & \log a_{m+7} & \log a_{m+8} \end{vmatrix}$$

1) 2 2) 1 3) 0 4) -2

MATHEMATICS

a,b,c are in GP. Then b^2= ac similarly,

$a_{m+1}^2 = a_m \ a_{m+2}$

Log on both sides

2Log$a_{m+1} = Loga_m + \ Loga_{m+2}$

2Log$a_{m+4} = Loga_{m+3} + \ Loga_{m+5}$

2Log$a_{m+7} = Loga_{m+6} + \ Loga_{m+8}$

$$\frac{1}{2}\begin{vmatrix} loga_m & loga_m + loga_{m+2} & loga_{m+2} \\ loga_{m+3} & loga_{m+3} + loga_{m+5} & loga_{m+5} \\ loga_{m+6} & loga_{m+6} + loga_{m+8} & loga_{m+8} \end{vmatrix}$$

= ½ (0) = 0

$\therefore$ *Answer is* (3)

MATHEMATICS

28. The Value of

$$\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & \log_z y & 1 \end{vmatrix}$$

1) 1 2) xyz 3) log xyz 4) 0

MATHEMATICS

$$\frac{1}{\log x \log y \log z}\begin{vmatrix} \log x & \log y & \log z \\ \log x & \log y & \log z \\ \log x & \log y & \log z \end{vmatrix} = 0$$

$$[\log_x x = \log_y y = \log_z z = 1]$$

$$\therefore \text{Answer is } (4)$$

MATHEMATICS

29. If $\begin{pmatrix} 1 & 1+x & 2+x \\ 8 & 2+x & 4+x \\ 27 & 3+x & 6+x \end{pmatrix}$ is a singular matrix then x is

1) 2 2) -1 3) 1 4) 0

MATHEMATICS

$$c_3 = c_3 - c_2 \begin{vmatrix} 1 & 1+x & 1 \\ 8 & 2+x & 2 \\ 27 & 3+x & 3 \end{vmatrix} = 0$$

$$By\ theorm\ No\ 5 \begin{vmatrix} 1 & x & 1 \\ 8 & x & 2 \\ 27 & x & 3 \end{vmatrix} = 0$$

x[1(3-2)-1(24-14)+1(8-7)] = 0

x = 0

$\therefore\ Answer\ is\ (4)$

MATHEMATICS

30. If $\Delta = \begin{vmatrix} \log x & \log y & \log z \\ \log 2x & \log 2y & \log 2z \\ \log 3x & \log 3y & \log 3z \end{vmatrix}$

1) 0 2) log (xyz) 3) log (6xyz) 4) 6 log (xyz)

MATHEMATICS

$$\Delta = \begin{vmatrix} logx & logy & logz \\ log2 + logx & log2 + logy & log2 + logz \\ log3 + logx & log3 + logy & log3 + logz \end{vmatrix}$$

$$=> \frac{c_1 - c_2}{c_2 - c_3} \begin{vmatrix} \log\left(\frac{x}{y}\right) & \log\left(\frac{y}{z}\right) & logz \\ \log\left(\frac{x}{y}\right) & \log\left(\frac{y}{z}\right) & log2 + logz \\ \log\left(\frac{x}{y}\right) & \log\left(\frac{y}{z}\right) & log3 + logz \end{vmatrix}$$

$$= 0 \therefore Answer\ is\ (1)$$

MATHEMATICS

1. If $A = \begin{pmatrix} 4 & -3 \\ 2 & -1 \end{pmatrix}$ then eigen value of A^{-1} =

1) 1,2   2) 1, ½   3) -1,-2   4) -1, -1/2

MATHEMATICS

$$A^{-1} = \frac{\text{Adj } A}{|A|} = \frac{1}{2}\begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$$

Eigen Values = $\frac{1}{2}|A - \lambda I| = \frac{1}{2}\begin{vmatrix} -1-\lambda & 3 \\ -2 & 4-\lambda \end{vmatrix} = 0$

$$\frac{1}{2}\left[\lambda^2 - 3\lambda + 2\right] = 0$$

$$\therefore \lambda = 1,2$$

Answer is (1)

MATHEMATICS

32. If $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = 0$ and $abc \neq 0$, then $a^{-1}+b^{-1}+c^{-1} =$

1) 0 2) 1 3) -1 4) abc

MATHEMATICS

$$abc + bc + ca + ab = 0$$

$$abc\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) = 0$$

$$\text{then } abc \neq 0 \text{ then } \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right) = 0$$

$$a^{-1} + b^{-1} + c^{-1} = -1$$

Answer is (3)

33. A root of $\begin{vmatrix} 0 & x-a & x-b \\ x+a & 0 & x-c \\ x+b & x+c & 0 \end{vmatrix} = 0$, then x is

1) a 2) b 3) c 4) 0

MATHEMATICS

$$\text{put x} = 0 \text{ then determinent} = 0$$

$$\begin{vmatrix} 0 & -a & -b \\ a & 0 & -c \\ b & c & 0 \end{vmatrix} = 0$$

$0 + a[0 + bc] - b[ac - 0] = 0$

$abc - abc = 0$

$$\therefore \textit{The answer is } (4)$$

MATHEMATICS

34. If A is matrix of order 3 such that A. adj A = 10 I

Then $|adj\ A|$ =

1) 10 2) 100 3) 1000 4) none

MATHEMATICS

$$|\text{adj } A| = |A|^{n-1} = |A|^{3-1} = |A|^2 = 10^2 = 100$$

$$\therefore \textit{Answer is } (2)$$

MATHEMATICS

35. If $A = \begin{pmatrix} \cos\pi/4 & \sin\pi/12 \\ \sin\pi/4 & \cos\pi/12 \end{pmatrix}$ Then $|A^{-1}| =$

1) 8 2) 4 3) 2 4) -2

MATHEMATICS

$$|A| = \cos\frac{\pi}{4} . \cos\frac{\pi}{12} - \sin\frac{\pi}{4} . \sin\frac{\pi}{12}$$

$$= \cos\left[\frac{\pi}{4} + \frac{\pi}{12}\right] = \cos\frac{\pi}{3} = \frac{1}{2}$$

$$|A^{-1}| = |A|^{-1} = \frac{1}{|A|} = \frac{1}{1/2} = 2$$

$$\therefore \textit{Answer is } (3)$$

MATHEMATICS

36. If $\begin{vmatrix} x+3 & x & x+2 \\ x & x+1 & x-1 \\ x+2 & 2x & 3x+1 \end{vmatrix} = ax^3+bx^2+cx+d$ then the value of d =

1) 1 2) 0 3) -1 4) 2

MATHEMATICS

$$\text{put } x = 0 \text{ then } d = \begin{vmatrix} 3 & 0 & 2 \\ 0 & 1 & -1 \\ 2 & 0 & 1 \end{vmatrix}$$

$= 3[1-0] – 0 + 2[0-2]$

$= 3 – 4$

$= -1$

$\therefore$ *Answer is* (3)

MATHEMATICS

36. Which of the following is not invertible ?

1) $\begin{pmatrix} 1 & -1 \\ 2 & -2 \end{pmatrix}$ 2) $\begin{pmatrix} 2 & -2 \\ 1 & 1 \end{pmatrix}$ 3) $\begin{pmatrix} -1 & -1 \\ -1 & 2 \end{pmatrix}$ 4) $\begin{pmatrix} 2 & 2 \\ 1 & -1 \end{pmatrix}$

MATHEMATICS

By definition $|A| = 0$ is a singular matrix

$$\begin{vmatrix} 1 & -1 \\ 2 & -2 \end{vmatrix} = -2 + 2 = 0$$

Since all other matrices except (1) $|A| \neq 0$

$\therefore$ Answer is (1)

38. The sum of the products of the elements of any row (or col) of |A| with the corresponding co-factors of the same row (or col) is always equal to

1)0 2) A 3) |A| 4) None

MATHEMATICS

If $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$

$\text{adj}A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix}$

By property

$|A| = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$ and so on

$\therefore$ *Answer is* (3)

MATHEMATICS

39. The sum of the products of the elements of any row (or column) of $|A|$ with the corresponding cofactors of any other row (or column) is always equal to

1) 0 2) A 3) $|A|$ 4) None

MATHEMATICS

$$\text{If } A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

$$\text{adj}A = \begin{bmatrix} A_{11} & A_{21} & A_{31} \\ A_{12} & A_{22} & A_{32} \\ A_{13} & A_{23} & A_{33} \end{bmatrix}$$

By property

$$a_{11}A_{21} + a_{12}A_{22} + a_{13}A_{23} = 0 \text{ and so on}$$

$$\therefore Answer\ is\ (3)$$

MATHEMATICS

40. $\begin{vmatrix} x & 4 & 4 \\ 4 & x & 3 \\ 3 & 3 & x \end{vmatrix} = 0$ then x is

1) 3,4,7 2) 3, 4,-7 3) -3,4,7 4) 0

MATHEMATICS

We know that

$$\begin{vmatrix} x & a & a \\ a & x & b \\ b & b & x \end{vmatrix} = (x-a)(x-b)(x+a+b)$$

$$\begin{vmatrix} x & 4 & 4 \\ 4 & x & 3 \\ 3 & 3 & x \end{vmatrix} = 0$$

$$(x-4)(x-3)(x+4+3) = 0$$

X=4,3,-7

$$\therefore Answer\ is\ (2)$$