BASIC CONCEPTS

1. Singular and Non-singul

Otherwise, it is a non-sing

2. Some Important Properti

(*i*) Let $A = [a_{ij}]$ be a squar

(*ii*) Let $A = [a_{ij}]$ be a squar

Note: Since area is positive

4. (*i*) If A is a skew-symmet

(*ii*) The determinant of a

MULTIPLE CHOICE QU

Choose and write the correct

1. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then

(*a*) 6

2. **The area of a triangle w**

(*a*) 9

3. **If A, B and C are angles**

(*a*) 0

11. The value of $\begin{vmatrix} 1 & \omega \\ \omega & \omega^2 \\ \omega^2 & \omega \end{vmatrix}$

(a) 1

12. If area of triangle is 35

(a) 12

13. If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and

(a) $a_{11}A_{31} + a_{12}A_{32} + a_1$

(c) $a_{21}A_{11} + a_{22}A_{12} + a_2$

14. The value of $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ =

(a) $A = 2abc, B = a+b+c$

(c) $A = 3abc, B = a+b+c$

22. The maximum value of

(a) $\frac{1}{2}$

23. The value of determina

(a) $2xyz$

24. The value of the determ

(a) 15

25. If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$, then the v

(a) $4|A|$

35. If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then

(*a*) 6

36. Which of the following

(*a*) Determinant is a sq

(*b*) Determinant is a nu

(*c*) Determinant is a nu

(*d*) None of these

37. Let $\Delta = \begin{vmatrix} 1 & \sin\theta \\ -\sin\theta & 1 \\ -1 & -\sin\theta \end{vmatrix}$

(*a*) $\Delta = 0$

38. If 1, ω, ω^2 are the cube

the value of $\begin{vmatrix} 1 & \omega^n \\ \omega^n & \omega^{2n} \\ \omega^{2n} & 1 \end{vmatrix}$

(a) $\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}$

46. If $f = \begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix}$ and g

(a) $x^2 + y^2 + z^2$

(c) $x^2 + y^2 + z^2 - xy - yz$

47. If $\Delta(x) = \begin{vmatrix} \sin\frac{x}{2} & 1 & \\ 1 & \sin\frac{}{} & \\ -\sin\frac{x}{2} & 1 & \end{vmatrix}$

(a) $\Delta(x)$ will be maxim

(c) The range of $\Delta(x)$ i

$\begin{vmatrix} x^2+x & 2x-1 & x+3 \end{vmatrix}$

(*ii*) Which of the follow

(*a*) $\begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$

(*c*) $\begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$

(*iii*) The value of x(leng

(*a*) 150 m

(*iv*) The value of y (brea

(*a*) 150 m.

(*v*) How much is the ar

(*a*) 60000 sq. m.

(*c*) 30000 m

Sol. (*i*) We have,

$(x - 50)(y + 50) =$

Also, $(x - 10)(y - 20$

(*iv*) From (*iii*) question,

Option (*a*) is correct

(*v*) Area of the rectangu

Option (*b*) is correct

2. Read the following and

Three friends Rahul, Ra
a vegetable shop Rahul
purchased 4 kg of potat
potato, 2 kg onion and 3

(*iii*) If $AX = B$, where A,

(*a*) $X = AB$

(*iv*) If $A = \begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & 2 \\ 6 & 2 & 3 \end{bmatrix}$ ther

(*a*) $-\frac{1}{5}\begin{bmatrix} 5 & -1 & -1 \\ 0 & -3 & 2 \\ 0 & 4 & 0 \end{bmatrix}$

(*c*) $\begin{bmatrix} 5 & -1 & -1 \\ 0 & -3 & 2 \\ -10 & 4 & -1 \end{bmatrix}$

(*v*) The cost of potato, c

(*a*) ₹5, ₹8 and ₹8

Sol. (*i*) From question

For Rahul $x + y + z$

For Ravi $4x + 3y + 2$

(*iv*) We have $A = \begin{bmatrix} 1 & 1 \\ 4 & 3 \\ 6 & 2 \end{bmatrix}$

$\therefore \quad |A| = \begin{vmatrix} 1 & 1 \\ 4 & 3 \\ 6 & 2 \end{vmatrix}$

$= 5 - 0 -$

Therefore , A^{-1} exist

Now, $A_{11} = 9 - 4 = 5$

$A_{12} = -(12 -$

$A_{13} = (8 - 18)$

$\therefore \quad \text{Adj } A = \begin{bmatrix} 5 & 0 \\ -1 & -3 \\ -1 & 2 \end{bmatrix}$

$\because \quad A^{-1} = \frac{1}{|A|} \text{ Ad}$

$= \frac{1}{} \begin{bmatrix} 5 \\ 0 \end{bmatrix}$

3. **Assertion (A) :** If A is a

Reason (R) : If A be

4. **Assertion (A) :** If $\begin{vmatrix} x \\ 18 \end{vmatrix}$

Reason (R) : If A is a

Answers

1. (c) **2.** (a)

HINTS/S

1. We have,

$$\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$$

$$\Rightarrow \quad x^2 - 36 = 36 - 36$$

$$= 3 + \cos 2A + \cos$$

$$= 3 + (\cos 2A + \cos$$

$$= 3 + \cos (A + B) .$$

$$= 3 + \cos (\pi - C) .$$

$$= 3 - \cos C \cos (A$$

$$= 2 - \cos C \{\cos (A$$

$$= 2 - \cos C \{\cos (A$$

$$= 2 - 2 \cos C \{\cos$$

$$= 2 - 2 \cos C \left\{2 \cos\right.$$

$$= 2 - 2 \cos C \{2 \cos$$

$$= 2\{1 - 2 \cos A \cos$$

$$\Rightarrow \cos^2 A + \cos^2 B + \cos$$

$$\Rightarrow -1 + \cos^2 A + \cos^2 B +$$

$(i) \Rightarrow \Delta = 0$

$$\Rightarrow \quad |A| . |A| = 3^3 |A|$$

$$\Rightarrow \quad |A| = 3^3 = 27 \quad \Rightarrow$$

Option (d) is correct.

10.
$$\Delta = \begin{vmatrix} 0 & a-b \\ b-a & 0 \\ c-a & c-b \end{vmatrix}$$

$$= (b-a)\{0-(a$$

$$= +(b-a)(a-$$

$$= -(a-b)(b-c$$

$$= 0$$

Option (c) is correct.

11.
$$\Delta = \begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & \omega & 1 \end{vmatrix}$$

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

$\therefore A = abc, B = a^3 + b^3 + c^3$

Option (d) is correct.

16. $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}, 2A = \begin{bmatrix} 2 & 4 \\ 8 & 4 \end{bmatrix}$

$|2A| = 8 - 32 = -24$

$|A| = 2 - 8 = 6,$

$\because |2A| = 4 \times (-6) = 4 \mid A$

$\Rightarrow \quad k = 4$

Option (a) is correct.

17. For any matrix A, $|A| =$

$\because$ A is symmetric so A

Option (a) is correct.

19. $\Delta = \frac{1}{2}\begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix} = \frac{1}{2}$

$\Rightarrow \quad x^3 - 67x + 126 = 0$

$\because \quad x = -9$ is a root of

$(x + 9)$ is a factor o

$\Rightarrow \quad x^3 + 9x^2 - 9x^2 - 81x$

$\Rightarrow \quad x^2(x + 9) - 9x(x + 9$

$\Rightarrow \quad (x + 9)(x^2 - 2x - 7x$

$\Rightarrow \quad (x + 9)(x(x - 2) - 7$

$\Rightarrow \quad (x + 9)(x - 2)(x - 7)$

$\Rightarrow \quad x = -9, 2, 7$

Other zeros are 2, 7

Option (a) is correct.

23. $\Delta = \begin{vmatrix} 0 & xy^2 & xz^2 \\ x^2y & 0 & yz^2 \\ x^2z & zy^2 & 0 \end{vmatrix} = -x$

$= x^3y^3z^3 + x^3y^3z^3 = 2x^3y$

$= 0$ $\left[\because A = \begin{bmatrix} 0 \\ -(a \\ -(a \end{bmatrix}\right.$

$\left.\therefore |A| = 0\right]$

Option (c) is correct.

29. We are given points

$A(1, 3), B(0, 0)$ and $D(k$

and $\text{ar}(\Delta ABD) = 3$ squa

$$i.e., \quad \frac{1}{2}\begin{vmatrix} 1 & 3 & 1 \\ 0 & 0 & 1 \\ k & 0 & 1 \end{vmatrix} = 3$$

Expanding along R_2, we

$$\Rightarrow \quad \frac{1}{2} \mid (-1)(0 - 3k) \mid =$$

$$\Rightarrow \quad k = \pm 2$$

Option (b) is correct.

$\Rightarrow \quad |-10+7\lambda| = 0 \Rightarrow$

Option (a) is correct.

35. $x^2 - 36 = 36 - 36$

$\Rightarrow \quad x^2 - 36 = 0$

$\Rightarrow \quad x^2 = 36$

$\Rightarrow \quad x = \pm 6$

Option (b) is correct.

36. (c) Determinant is a nu

37. $\Delta = \begin{vmatrix} 1 & \sin\theta & \\ -\sin\theta & 1 & s \\ -1 & -\sin\theta & \end{vmatrix}$

$= 1(1+\sin^2\theta) - \sin\theta($

$\Delta = 2(1+\sin^2\theta) \quad \ldots(i)$

Now, $\because \quad -1 \le \sin\theta \le 1$

$f(0) = -2c + 2c = 0$

Option (d) is correct.

43. $\begin{vmatrix} 0 & 2 & 0 \\ \lambda & 3 & \lambda \\ \lambda & 5 & 6 \end{vmatrix} = -16$ then the

$\begin{vmatrix} 0 & 2 & 0 \\ \lambda & 3 & \lambda \\ \lambda & 5 & 6 \end{vmatrix} = -16 \Rightarrow -\lambda(1$

$\Rightarrow \quad -12\lambda + 2\lambda^2 = -16 =$

$\Rightarrow \quad \lambda^2 - 6\lambda + 8 = 0 \Rightarrow ($

$\Rightarrow \quad \lambda = 2, 4$

$\therefore$ Sum of two values o

Option (d) is correct.

44. Let $\Delta = \begin{vmatrix} 0 & -1 \\ \cos\theta & \sin\theta \end{vmatrix}$

$$= \sin\frac{x}{2}\left(-\sin\frac{x}{2}+\sin\frac{x}{2}\right.$$

$$= \sin\frac{x}{2}\times 0+2+2\sin^2\frac{x}{2}$$

$$= 2\sin^2\frac{x}{2}+2 = 2+2\sin$$

$$= 3-\cos x$$

Now $-1\le\cos x\le 1\Rightarrow$

$$\Rightarrow 3+1\ge 3-\cos x\ge 3$$

$$\Rightarrow 2\le 3-\cos x\le 4\Rightarrow 2$$

Also $\Delta(x)=3-\cos x$

$$\Rightarrow \Delta'(x)=\sin x$$

$$\therefore \Delta'(x)=0\Rightarrow \sin x=0$$

$$\Delta''(x)=\cos x$$