Chapter 8 Matrices Ex 8.1

Question 1.
(i) $[25-11]$
(ii) $[2\ 3\ -7]$
(iii) $\begin{bmatrix} 3 \\ 0 \\ -1 \end{bmatrix}$
(iv) $\begin{bmatrix} 2 & 0 \\ 1 & -4 \\ 0 & 7 \end{bmatrix}$
(v) $[278-12-\sqrt{0}]$
(vi) $[000000]$

Solution:

(i) It is square matrix of order 2

(ii) It is row matrix of order 1×3

(iii) It is column matrix of order 3×1

(iv) It is matrix of order 3×2

(v) It is matrix of order 2×3

(vi) It is zero matrix of order 2×3

Question 2.
(i) If a matrix has 4 elements, what are the possible order it can have ?
(ii) If a matrix has 8 elements, what are the possible order it can have ?

Solution:

(i) It can have 1×4, 4×1 or 2×2 order

(ii) It can have 1×8, 8×1, 2×4 or 4×2 order

Question 3.
Construct a 2 x 2 matrix whose elements a_{ij} are given by
(i) $a_{ij} = 2i - j$
(ii) $a_{ij} = i.j$

Solution:

(i) It can be $\begin{bmatrix} 1 & 0 \\ 3 & 2 \end{bmatrix}$

(ii) It can be $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$

Question 4.
Find the values of x and y if : $[2x+y\ 3x-2y]=[54]$

Solution:

Comparing corresponding elements,

$2x + y = 5$ ...(i)

$3x - 2y = 4$ ...(ii)

Multiply (i) by 2 and (ii) by '1' we get

$4x + 2y = 10$, $3x - 2y = 4$

Adding we get, $7x = 14 \Rightarrow x = 2$

Substituting the value of x in (i)

$2 \times 2 + y = 5 \Rightarrow 4 + y = 5$

$y = 5 - 4 = 1$

Hence $x = 2$, $y = 1$

Question 5.

Find the value of x if $\begin{bmatrix} 3x+y & -y \\ 2y-x & 3 \end{bmatrix}=\begin{bmatrix} 1 & 2 \\ -5 & 3 \end{bmatrix}$

Solution:

$$\begin{bmatrix} 3x + y & -y \\ 2y - x & 3 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ -5 & 3 \end{bmatrix}$$

Comparing the corresponding terms, we get.

$-y = 2$

$\Rightarrow y = -2$

$3x + y = 1 \Rightarrow 3x = 1 - y$

$\Rightarrow 3x = 1 - (-2) = 1 + 2 = 3 \Rightarrow x = \dfrac{3}{3} = 1$

Hence $x = 1$, $y = -2$

Question 6.

If $\begin{bmatrix} x+3 & 4y-4 \\ x+y \end{bmatrix}=\begin{bmatrix} 5 & 3 \\ 4 & 9 \end{bmatrix}$,find values of x and y

Solution:

$$\begin{bmatrix} x+3 & 4 \\ y-4 & x+y \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 3 & 9 \end{bmatrix}$$

Comparing the corresponding terms, we get.

x + 3 = 5

⇒ x = 5 − 3 = 2

⇒ y − 4 = 3

⇒ y = 3 + 4 = 7

x = 2, y = 7

Question 7.

Find the values of x, y and z if

[x+2635z]=[−53y2+y−20]

Solution:

Comparing the corresponding elements of equal determinents,

x + 2 = -5

⇒ x = -5 − 2 = -7

∴ $x = -7,\ 5z = -20$

⇒ $z = -\dfrac{20}{5} = -4 \Rightarrow y^2 + y = 6$

⇒ $y^2 + y - 6 = 0$ ⇒ $y^2 + 3y - 2y - 6 = 0$

⇒ $y(y+3) - 2(y+3) = 0 \Rightarrow (y+3)(y-2) = 0$

Either $y + 3 = 0$,

then $y = -3$ or $y - 2 = 0$, then $y = 2$

Hence $x = -7,\ y = -3,\ 2,\ z = -4$.

Question 8.

Find the values of x, y, a and b if

[x−2a+2by3a−b]=[3511]

<u>Solution:</u>

Comparing corresponding elements

$x - 2 = 3, y = 1$

$x = 3 + 2 = 5$

$a + 2b = 5$ ......(i)

$3a - b = 1$ ....(ii)

Multiplying (*i*) by 1 and (*ii*) by 2

$a + 2b = 5, \quad 6a - 2b = 2$

Adding, we get, $7a = 7 \Rightarrow a = 1$

Substituting the value of a in   ...(*i*)

$1 + 2b = 5 \Rightarrow 2b = 5 - 1 = 4 \Rightarrow b = 2$

Hence $x = 5, y = 1, a = 1, b = 2$

<u>Question 9.</u>
<u>Find the values of a, b, c and d if</u>
$$[a+b \quad 5+c \quad 3 \quad ab]=[6 \quad -1 \quad d \quad 8]$$

Solution:

$$\begin{bmatrix} a+b & 3 \\ 5+c & ab \end{bmatrix} = \begin{bmatrix} 6 & d \\ -1 & 8 \end{bmatrix}$$

Comparing the corresponding terms, we get.

$3 = d \Rightarrow d = 3$

$\Rightarrow 5 + c = -1$

$\Rightarrow c = -1 - 5$

$\Rightarrow c = -6$

$a + b = 6$ and $ab = 8$

$\therefore (a - b)^2 = (a + b)^2 - 4ab$

$= (6)^2 - 4 \times 8 = 36 - 32 = 4 = (\pm 2)^2$

$\therefore a - b = \pm 2$

(i) If $a - b = 2$

$a + b = 6$

Adding, we get $2a = 8 \Rightarrow a = 4$

$a + b = 6 \Rightarrow 4 + b = 6 \Rightarrow b = 6 - 4 = 2$

$\therefore a = 4, b = 2$

(ii) If $a - b = -2$

$a + b = 6$

Adding, we get, $2a = 4 \Rightarrow a = \dfrac{4}{2} = 2$

$a + b = 6 \Rightarrow 2 + b = 6 \Rightarrow b = 6 - 2 = 4$

$\therefore a = 2, b = 4$

Hence $a = 4, b = 2$, or $a = 2, b = 4$

$c = -6$ and $d = 3$

Question 10.
Find the values of x, y, a and b, if
[3x+4y2x−2ya+b2a−b−1]=[2245−5−1]

<u>Solution:</u>

Comparing the corresponding terms, we get.

$3x + 4y = 2$ ......(i)

$x - 2y = 4$ ....(ii)

Multiplying (i) by 1 and (ii) by 2

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

Adding we get, $5x = 10 \Rightarrow x = 2$

Substituting the value of x in (i)

$3 \times 2 + 4y = 2$, $6 + 4y = 2$, $4y = 2 - 6 = -4$

$y = -1$

$\therefore x = 2, y = -1$

$a + b = 5$ ...(iii)

$2a - b = -5$ ...(iv)