

Date: 12-Jul-2026
Linear Equations in Two Variables
Marks: 20
Time: 60min
Q.1(A) Choose the correct alternative. (4)
i If $x + y = 10$ and $x - y = 12$, then
☐ (A) $x = 11, y = 1$
☒ (B) $x = 11, y = -1$
☐ (C) $x = -11, y = 1$
☐ (D) $x = -11, y = -1$
Ans: $x + y = 10$... (i)

 $x - y = 12$... (ii)

Adding (i) and (ii), we get

$$\begin{array}{r} x + y = 10 \\ + x - y = 12 \\ \hline \end{array}$$

$$2x = 22$$

$$\therefore x = 11$$

$$\therefore (i) \Rightarrow y = -1$$

ii For simultaneous equations in variables x and y , $D_x = 49$, $D_y = -63$, $D = 7$ then what is x ?
☒ (A) 7

☐ (B) -7

☐ (C) $\frac{1}{7}$
☐ (D) $-\frac{1}{7}$
Ans: As $x = \frac{D_x}{D}$, we get

$$x = \frac{49}{7} = 7$$

iii The value of m for which the value of the determinant $\begin{vmatrix} -3 & m \\ -5 & -4 \end{vmatrix}$ is -18 is
☐ (A) 3

☐ (B) -3

☐ (C) 6

☒ (D) -6

Ans: Given $\begin{vmatrix} -3 & m \\ -5 & -4 \end{vmatrix} = -18$

$$\therefore 12 + 5m = -18$$

$$\therefore 5m = -30$$

$$\therefore m = -6$$

iv If the point $(m, 11)$ lies on the graph of the equation $11x - 5y = 11$, then the value of m is
☐ (A) 8

☐ (B) 7

☐ (C) 9

☒ (D) 6

Ans: Substitute $x = m$ and $y = 11$ in the given equation, we get

$$11m - 5(11) = 11$$

$$\Rightarrow m - 5 = 1$$

...[Divide both sides by 11]

$$\Rightarrow m = 6$$

Q.1(B) Solve the following questions.

(2)

i Find the value of each of the following determinant.

$$\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix} = (4 \times 7) - (3 \times 2) = 28 - 6$$
$$\therefore \begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix} = 22$$

ii If $15x + 17y = 21$ and $17x + 15y = 11$, then find the value of $x + y$.

$$\begin{array}{r} 15x + 17y = 21 \\ + \quad 17x + 15y = 11 \\ \hline 32x + 32y = 32 \end{array}$$
$$\therefore 32(x + y) = 32$$
$$\therefore x + y = \frac{32}{32} = 1$$

Q.2 Solve the following questions.(Any two)

(4)

i Solve the following simultaneous equations.

$$x + 7y = 10; 3x - 2y = 7$$

$$x + 7y = 10$$

$$\therefore x = 10 - 7y \quad \dots(i)$$

$$3x - 2y = 7 \quad \dots(ii)$$

Substituting $x = 10 - 7y$ in equation (ii), we get

$$3(10 - 7y) - 2y = 7$$

$$\therefore 30 - 21y - 2y = 7$$

$$\therefore -23y = 7 - 30$$

$$\therefore -23y = -23$$

$$\therefore y = \frac{-23}{-23} = 1$$

Substituting $y = 1$ in equation (i), we get

$$x = 10 - 7y$$

$$= 10 - 7(1)$$

$$= 10 - 7 = 3$$

$\therefore (x, y) = (3, 1)$ is the solution of the given simultaneous equations.

ii Two numbers differ by 3. The sum of twice the smaller number and thrice the greater number is 19. Then the Smaller number is.

☐ (A) -5

☐ (B) -2

☒ (C) 2

☐ (D) 5

Ans: Let the greater number be x and the smaller number be y .

According to the first condition, we get

$$\therefore x - y = 3 \quad \dots(i)$$

According to the second condition, we get

$$\therefore 3x + 2y = 19 \quad \dots(ii)$$

Solving equations (i) and (ii), we get

$$x = 5 \text{ and } y = 2$$

∴ The smaller number is 2.

iii Solve the following equations by Cramer's method.

$$7x + 3y = 15; 12y - 5x = 39$$

The given simultaneous equations are

$$7x + 3y = 15 \quad \dots(i)$$

$$12y - 5x = 39$$

$$\text{i.e. } -5x + 12y = 39 \quad \dots(ii)$$

Equations (i) and (ii) are in $ax + by = c$ form.

Comparing the given equations with $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$, we get

$$a_1 = 7, b_1 = 3, c_1 = 15 \text{ and}$$

$$a_2 = -5, b_2 = 12, c_2 = 39$$

$$\begin{aligned} \therefore D &= \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \begin{vmatrix} 7 & 3 \\ -5 & 12 \end{vmatrix} \\ &= (7 \times 12) - (3 \times -5) \\ &= 84 - (-15) \end{aligned}$$

$$= 84 + 15 = 99 \neq 0$$

$$\begin{aligned} D_x &= \begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix} = \begin{vmatrix} 15 & 3 \\ 39 & 12 \end{vmatrix} \\ &= (15 \times 12) - (3 \times 39) \\ &= 180 - 117 = 63 \end{aligned}$$

$$\begin{aligned} D_y &= \begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix} = \begin{vmatrix} 7 & 15 \\ -5 & 39 \end{vmatrix} \\ &= (7 \times 39) - (15 \times -5) \\ &= 273 - (-75) \\ &= 273 + 75 = 348 \end{aligned}$$

∴ By Cramer's rule, we get

$$x = \frac{D_x}{D} \quad \text{and} \quad y = \frac{D_y}{D}$$

$$\therefore x = \frac{63}{99} \quad \text{and} \quad y = \frac{348}{99}$$

$$\therefore x = \frac{7}{11} \quad \text{and} \quad y = \frac{116}{33}$$

$$\therefore (x, y) = \left(\frac{7}{11}, \frac{116}{33} \right) \text{ is the solution of the given simultaneous equations.}$$

Q.3 Complete the following activity.

(3)

i The ages of Durga and Hari are in the ratio 5:7. After eight years, the ratio of their ages will be 3:4. Find their present ages.

Let the present ages of Durga and Hari be x years and y years respectively.

∴ According to the first condition, the ages of Durga and Hari are in the ratio 5 : 7.

$$\therefore \boxed{} = \frac{5}{7}$$

$$\therefore \boxed{} \dots(i)$$

After eight years,

Age of Durga = $(x + 8)$ years

Age of Hari = $(y + 8)$ years

According to the second condition, after 8 years, the ratio of their ages will be 3 : 4.

$$\therefore \frac{x + 8}{y + 8} = \boxed{}$$

$$\therefore \boxed{} \dots(\text{ii})$$

Multiplying equation (i) by 3 and equation (ii) by 5, we get

$$21x - 15y = 0 \qquad \dots(\text{iii})$$

$$20x - 15y = -40 \qquad \dots(\text{iv})$$

Subtracting equation (iv) from equation (iii) Present age of Durga is $\boxed{}$ years and that of Hari is $\boxed{}$ years.

Let the present ages of Durga and Hari be x years and y years respectively.

$\therefore$ According to the first condition, the ages of Durga and Hari are in the ratio 5 : 7.

$$\therefore \frac{x}{y} = \frac{5}{7}$$

$$\therefore \boxed{7x - 5y = 0} \qquad \dots(\text{i})$$

After eight years,

Age of Durga = $(x + 8)$ years

Age of Hari = $(y + 8)$ years

According to the second condition, after 8 years, the ratio of their ages will be 3 : 4.

$$\therefore \frac{x + 8}{y + 8} = \frac{3}{4}$$

$$\therefore \boxed{4x - 3y = -8} \qquad \dots(\text{ii})$$

Multiplying equation (i) by 3 and equation (ii) by 5, we get

$$21x - 15y = 0 \qquad \dots(\text{iii})$$

$$20x - 15y = -40 \qquad \dots(\text{iv})$$

Subtracting equation (iv) from equation (iii) Present age of Durga is $\mathbf{40}$ years and that of Hari is $\mathbf{56}$ years.

Q.4 Solve the following questions.(Any one) (3)

i Sum of the present ages of Manish and Savita is 31. Manish's age 3 years ago was 4 times the age of Savita. Find their present ages.

Let the present ages of Manish and Savita be x years and y years respectively.

According to the first condition, sum of the present ages of Manish and Savita is 31.

$$\therefore x + y = 31 \qquad \dots(\text{i})$$

3 years ago,

Manish's age = $(x - 3)$ years

Savita's age = $(y - 3)$ years

According to the second condition, 3 years ago Manish's age was 4 times the age of Savita.

$$(x - 3) = 4(y - 3)$$

$$\therefore x - 3 = 4y - 12$$

$$\therefore x - 4y = -12 + 3$$

$$\therefore x - 4y = -9 \qquad \dots(\text{ii})$$

Subtracting equation (ii) from (i), we get

$$\begin{array}{r}
 x + y = 31 \\
 x - 4y = -9 \\
 \hline
 - \quad + \quad + \\
 \hline
 5y = 40 \\
 \therefore y = \frac{40}{5} = 8
 \end{array}$$

Substituting $y = 8$ in equation (i), we get

$$x + y = 31$$

$$x + 8 = 31$$

$$\therefore x = 31 - 8$$

$$\therefore x = 23$$

$\therefore$ The present ages of Manish and Savita are 23 years and 8 years respectively.

ii Solve the following simultaneous equations.

$$99x + 101y = 499; 101x + 99y = 501$$

$$99x + 101y = 499 \quad \dots(i)$$

$$101x + 99y = 501 \quad \dots(ii)$$

Adding equations (i) and (ii), we get

$$\begin{array}{r}
 99x + 101y = 499 \\
 +101x + 99y = 501 \\
 \hline
 200x + 200y = 1000 \\
 \therefore x + y = \frac{1000}{200} \quad \dots[\text{Dividing both sides by 200}] \\
 \therefore x + y = 5 \quad \dots(iii)
 \end{array}$$

Subtracting equation (ii) from (i), we get

$$\begin{array}{r}
 99x + 101y = 499 \\
 101x + 99y = 501 \\
 \hline
 -2x + 2y = -2 \\
 \therefore x - y = \frac{-2}{-2} \quad \dots[\text{Dividing both sides by } -2] \\
 \therefore x - y = 1 \quad \dots(iv)
 \end{array}$$

Adding equations (iii) and (iv), we get

$$\begin{array}{r}
 x + y = 5 \\
 +x - y = 1 \\
 \hline
 2x = 6 \\
 \therefore x = \frac{6}{2} = 3
 \end{array}$$

Substituting $x = 3$ in equation (iii), we get

$$x + y = 5$$

$$3 + y = 5$$

$$\therefore y = 5 - 3 = 2$$

$\therefore (x, y) = (3, 2)$ is the solution of the given simultaneous equations.

Q.5 Solve the following questions.(Any one)

(4)

- i Kantabai bought $1\frac{1}{2}$ kg tea and 5 kg sugar from a shop. She paid ₹ 50 as return fare for rickshaw. Total expense was ₹ 700. Then she realised that by ordering online the goods can be bought with free home delivery at the same price. So, next month she

placed the order online for 2 kg tea and 7 kg sugar. She paid ₹ 880 for that. Find the rate of sugar and tea per kg.

Let the rate of tea be ₹ x per kg and that of sugar be ₹ y per kg.

According to the first condition, cost of

$1\frac{1}{2}$ kg tea + cost of 5 kg sugar + fare for rickshaw = total expense

$$\therefore 1\frac{1}{2}x + 5y + 50 = 700$$

$$\therefore \frac{3}{2}x + 5y = 700 - 50$$

$$\therefore \frac{3}{2}x + 5y = 650$$

$$\therefore 3x + 10y = 1300 \quad \dots(i) \text{ [Multiplying both sides by 2]}$$

According to the second condition, cost of 2 kg tea and 7 kg sugar is 880.

$$2x + 7y = 880 \quad \dots(ii)$$

Multiplying equation (i) by 2, we get

$$6x + 20y = 2600 \quad \dots(iii)$$

Multiplying equation (ii) by 3, we get

$$6x + 21y = 2640 \quad \dots(iv)$$

Subtracting equation (iii) from (iv), we get

$$6x + 21y = 2640$$

$$6x + 20y = 2600$$

$$\begin{array}{r} - \quad - \quad - \\ \hline y = 40 \end{array}$$

Substituting $y = 40$ in equation (i), we get

$$3x + 10y = 1300$$

$$3x + 10(40) = 1300$$

$$\therefore 3x + 400 = 1300$$

$$\therefore 3x = 1300 - 400$$

$$\therefore 3x = 900$$

$$\therefore x = \frac{900}{3} = 300$$

∴ The rate of tea is ₹300 per kg and that of sugar is ₹40 per kg.

ii **Convert the following equations into simultaneous equations and solve:**

$$\sqrt{\frac{x}{y}} = 4, \frac{1}{x} + \frac{1}{y} = \frac{1}{xy}$$

$$\sqrt{\frac{x}{y}} = 4$$

Squaring on both sides, we get

$$\frac{x}{y} = 16$$

$$\therefore x = 16y \quad \dots(i)$$

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{xy}$$

Multiplying both sides by xy , we get

$$y + x = 1$$

$$\text{i.e., } x + y = 1 \quad \dots(ii)$$

Substituting $x = 16y$ in equation (ii), we get

$$16y + y = 1$$

$$\therefore 17y = 1$$

$$\therefore y = \frac{1}{17}$$

Substituting $y = \frac{1}{17}$ in equation (i), we get

$$x = \frac{16}{17}$$

$\therefore (x, y) = \left(\frac{16}{17}, \frac{1}{17} \right)$ is the solution of the given equations.