BOARD OF SECONDARY EDUCATION (AP)

SUMMATIVE ASSESSMENT – II

TENTH CLASS MATHEMATICS MODEL PAPER

PAPER – I (ENGLISH VERSION)

Time: 2 hrs. 45 mins. **PART – A & B** **Maximum Marks: 40**

INSTRUCTIONS:

i) **In the time duration of 2 hrs. 45 mins. 15 minutes of time is allotted to read and understand the question paper.**

ii) **Answer the questions under PART – A on separate answer book.**

iii) **Write the answers to the questions under PART – B on the question paper itself and attach it to the answer book of PART – A.**

Time: 2 hrs. **PART – A** **Marks: 30**

INSTRUCTIONS:

i) PART – A comprises of three Sections I, II, III.

ii) All the questions are compulsory.

iii) There is no overall choice. However, there is an Internal Choice to the questions under Section III.

SECTION – I

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries ONE Mark. **4 × 1 = 4**

1. Find the value of $\log_{12}18 + \log_{12}8$.

2. Write an equation of line geometrically intersect to the line $5x + 6y + 3 = 0$.

3. Find the 6th term in G.P. $1, -\frac{1}{3}, \frac{1}{9}, -\frac{1}{27}$ .....?

4. Find the total surface area of sphere with diameter 14 cm.

SECTION – II

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries TWO marks. **5 × 2 = 10**

5. Find the quadratic polynomial whose zeros are 5 and $-\frac{1}{5}$ respectively.

6. How many three digit numbers are divisible by 7.

7. Solve $3x - y = 40$ and $4x - 2y = 50$.

8. Find the roots of $(3x - 2)^2 - 4(3x - 2) + 3 = 0$.

9. Find the volume of largest right circular cone that can be out of a cube whose edge is 7 cm.

SECTION – III

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries FOUR marks.

iii) Each question has Internal Choice. **4 × 4 = 16**

10. **a)** Change into the form of *l*ogN and find the value of N.

i) 2 *l*og 3 + *l*og 5

ii) *l*og 64 – *l*og $\frac{1}{2}$

iii) $\frac{1}{3}$ *l*og 512

iv) 3 *l*og 5 + 2 *l*og 3 – *l*og 45

(OR)

b) Write the following into set form and find A ∪ B, A ∩ B, A – B; where

A = { x/x is a two digit number whose sum of the digits is 9 }

B = {x/x is a two digit number which is a multiple of 6 }

11. **a)** On dividing $x^3 - 3x^2 + 5x - 3$ by g(x), the quotient and remainders are (x – 3) and (7x – 9) respectively then find g(x).

(OR)

b) A hemispherical bowl of internal radius 15 cm. contains a liquid is to be filled into cylinderical bottles of diameter 5 cm. and height 6 cm. How many bottles are need to empty the bowl?

12. **a)** The sum of the 5^{th} and 10^{th} terms of an A.P. is 75 and 8^{th} and 10th terms is 135. Find first four terms of the A.P.

(OR)

b) A motor boat whose speed is 18 km/hr in still water if takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream?

13. **a)** Draw the graph for $x^2 + 4x - 5$ and show that the X – coordinates of point of intersection of X – axis is zeros of that polynomial.

(OR)

b) Solve the pair of equations graphically 2x + y – 6 = 0, 4x – 2y – 4 = 0.

Time: 30 Minutes **PART – B** **Maximum Marks: 10**

INSTRUCTIONS:

i) Answer ALL the questions.

ii) Each question carries $\frac{1}{2}$ mark.

iii) Answers are to be written in question paper only.

iv) Marks will not be awarded in any case of over writing and re–writing or erased answers.

v) Write the CAPITAL LETTER (A, B, C, D) showing the correct answer for the following questions in the brackets provided against them. **$20 \times \frac{1}{2} = 10$**

SECTION – IV

14. Which of the following is non – terminating repeating decimal ( )

A) $\frac{26}{65}$ B) $\frac{13}{32}$ C) $\frac{124}{375}$ D) $\frac{6}{23}$

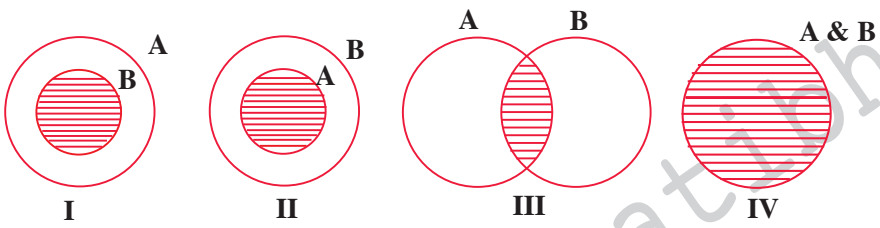
15. H.C.F of 12 and 18 is ( )

A) 12 B) 36 C) 6 D) 18

16. Decimal form of $\frac{7 \times 25}{2^3 \times 5^3}$ ( )

A) 0.175 B) 1.75 C) 0.0175 D) 17.5

17. Which of the following diagram represents $A \cap B$ when $A \subset B$ ( )



A) I B) II C) III D) IV

18. A is the set of factors of 12 which does not belong to A ( )

A) 1 B) 4 C) 5 D) 12

19. A = {5, 7, 8}; B = {8, 6, 4} then which of the following set represents {6, 4} ( )

A) $A \cup B$ B) $A \cap B$ C) $A - B$ D) $B - A$

20. The graph of the polynomial $ax^2 + bx + c$ $(a = 0)$ represents ( )

A) Parabola B) Straight line C) Circle D) Ellipse

21. $p(x) = g(x).q(x) + r(x)$; g(x) is a linear polynomial then the degree of r(x) is ( )

A) 0 B) 1 C) 2 D) 3

22. If α, β are the zeros of a quadratic polynomial p(x) and $\alpha = \beta$, then the number of intercepts on X – axis made by the graph p(x) are ( )

A) 3 B) 2 C) 1 D) 0

23. The pair of linear equations $2x + 3y + k = 0$, $6x + 9y + 3 = 0$ has an infinite solutions then k = ... ( )

A) 2 B) 3 C) 0 D) 1

24. The condition, if $ax + by + c = 0$ represents a linear equation in 2 variables x and y is ( )

A) $|a| + |b| \neq 0$ B) $a^2 + b^2 \neq 0$ C) $a + b = 0$ D) A, B

25. Sum of the roots of $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$ is ( )

A) $\frac{7}{\sqrt{2}}$ B) $-\frac{7}{\sqrt{2}}$ C) 5 D) 7

26. The roots are equal for $bx^2 + cx + a = 0$ then a = ... ( )

A) $\frac{b^2}{4a}$ B) $\frac{c^2}{4a}$ C) $\frac{c^2}{4b}$ D) $\frac{b^2}{4c}$

27. The quadratic equation having roots are $(2 + \sqrt{3})$, $(2 - \sqrt{3})$ is ( )

A) $x^2 - x + 4 = 0$ B) $x^2 - 4x + 1 = 0$

C) $x^2 + 4x + 3 = 0$ D) $x^2 + x - 3 = 0$

28. In an A.P. $S_n = 4n^2 - 3n$, then t_{10} = ... ( )

A) 400 B) 370 C) 297 D) 73

29. Which term in the G.P. $\sqrt{3}, 3, 3\sqrt{3}, \ldots$ is 729 ( )

A) 12 B) 6 C) 18 D) 9

30. Sum of 'n' terms in A.P. is ( )

A) $S_n = \frac{n}{2}[2a + (n - 1)d]$ B) $S_n = a + (n - 1)d$

C) $S_n = \frac{n}{2}[a + l]$ D) A, C

31. A heap of rice is in the form of a cone, its diameter 12 m. and height 7 m, its volume is ..... cu.m ( )

A) 264 B) 254 C) 262 D) 252

32. The volume of a hemisphere of radius $\frac{7}{2}$ cm. is ..... cu.cm

A) $\frac{539}{7}$ B) $\frac{539}{3}$ C) $\frac{539}{4}$ D) $\frac{539}{6}$

33. A cylinder, a cone and a hemisphere are of equal base and have the same height then the ratio of their volumes is ..... ( )

A) 1 : 2 : 3 B) 1 : 3 : 2 C) 3 : 1 : 2 D) 3 : 2 : 1

ANSWERS

PART – A

SECTION – I

1. Find the value of $\log_{12}18 + \log_{12} 8$.

A: Given $\log_{12}18 + \log_{12} 8$

$= \log_{12} 18 \times 8 \qquad (\because \log a + \log b = \log ab)$

$= \log_{12} 144 = \log_{12} 12^2 = 2 \log_{12} 12 = 2 \times 1 = 2$

2. Write an equation of line geometrically intersect to the line 5x + 6y + 3 = 0.

A: For the linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ then the lines are geometrically intersect each other.

$\therefore$ We can write any equation of the line geometrically intersect to the line 5x + 6y + 3 = 0 by satisfying above condition.

for example, 6x – 7y + 5 = 0 is an solution.

3. Find the 6th term in G.P. 1, $-\frac{1}{3}, \frac{1}{9}, -\frac{1}{27}$ .....?

A: In the given G.P. $a_1, a_2 = a_1 . r = -\frac{1}{3}$

common ratio $r = \frac{a_2}{a_1} = \frac{-\frac{1}{3}}{1} = -\frac{1}{3}$

6th term $a_1r^5 = 1\left(-\frac{1}{3}\right)^5 = \frac{-1}{243}$

4. Find the total surface area of sphere with diameter 14 cm.

A: Given diameter of the sphere d = 14 c.m.

Total surface area of the sphere = $4\Pi r^2$

$= 4 \times \frac{22}{7} \times \frac{14}{2} \times \frac{14}{2}$

= 616 sq.cm.

SECTION – II

5. Find the quadratic polynomial whose zeros are 5 and $-\frac{1}{5}$ respectively.

A: Given that zeros of the polynomial are $\alpha = 5, \beta = -\frac{1}{5}$

The polynomial whose zeros α, β are = $x^2 - x(\alpha + \beta) + \alpha\beta$

$= x^2 - x\left(5 + \left(-\frac{1}{5}\right)\right) + 5\left(-\frac{1}{5}\right)$

$= x^2 - \frac{24}{5}x - 1$

(or) $5x^2 - 24x - 5$

6. How many three digit numbers are divisible by 7.

A: Three digit numbers are 100, 101, ..., 999

we know that 105 is the first 3 digit number multiple of 7 and 994 is the last 3 digit number multiple of 7.

$\therefore$ Required progression is 105, 112, ..., 994

This is in A.P. ($\because$ 112 – 105 = 119 – 112 = 7)

Here $a_1 = 105, a_2 = 112, a_n = 994$

$d = 112 - 105 = 7$

$a_n = a_1 + (n - 1)d$

$\Rightarrow 994 = 105 + (n - 1)7$

$\Rightarrow (n - 1)7 = 994 - 105 = 889$

$\Rightarrow n - 1 = \frac{889}{7} = 127$

$\therefore n = 127 + 1 = 128$

$\therefore$ Number of three digit numbers are divisible by 7 are 128

7. Solve 3x – y = 40 and 4x – 2y = 50.

A: Given equations are

$3x - y = 40$ .....(1)

$4x - 2y = 50$ .....(2)

$2 - 1 \times 2 \Rightarrow 4x - 2y = 50$

$$\begin{array}{r} 6x - 2 = 80 \\ \hline -2x = -30 \\ \hline \end{array}$$

$$x = \frac{-30}{-2} = 15$$

Substitute x = 15 in eq (1), we get

$3 \times 15 - y = 40$

$45 - 40 = y$

$\therefore 5 = y$

$\therefore x = 15, y = 5$

8. Find the roots of $(3x - 2)^2 - 4(3x - 2) + 3 = 0$.

A: Given equation is $(3x - 2)^2 - 4(3x - 2) + 3 = 0$

Let 3x – 2 = a then the equation is

$\therefore a^2 - 4a + 3 = 0$

$\Rightarrow a^2 - 3a - a + 3 = 0$

$\Rightarrow a(a - 3) - 1(a - 3) = 0$

$\Rightarrow (a - 3)(a - 1) = 0$

$\Rightarrow a - 3 = 0$ or $a - 1 = 0$

$a = 3$ or $a = 1$

substitute $a = 3x - 2 \Rightarrow 3x - 2 = 3$ or $3x - 2 = 1$

$\Rightarrow 3x = 3 + 2$ or $3x = 1 + 2$

$\Rightarrow x = \frac{5}{3}$ or $x = \frac{3}{3} = 1$

9. Find the volume of largest right circular cone that can be out of a cube whose edge is 7 cm.

A: The edge of the cube = 7 cm.

if we cut a largest right circular cone from the cube then the diameter of the cone d = 7 cm.

Radius of the cone $r = \frac{7}{2}$ cm.

Also height of the cone h = 7 cm.

volume of the cone $= \frac{1}{3}\Pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7$

$= \frac{847}{6}$

$= 141.17 \text{ cm}^3$

SECTION – III

10. a) Change into the form of logN and find the value of N.

i) 2 *log* 3 + *log* 5

ii) *log* 64 – *log* $\frac{1}{2}$

iii) $\frac{1}{3}$ *log* 512

iv) 3 *log* 5 + 2 *log* 3 – *log* 45

A: Given that

i) 2 *log* 3 + *log* 5 = *log* 3^2 + *log* 5

= *log* 9 × 5 = *log* 45 this is in the form of *log* N

$\therefore$ N = 45

ii) *log* 64 – *log* $\frac{1}{2}$ = *log* $\frac{64}{\frac{1}{2}}$ = *log* $\frac{64 \times 2}{1}$ = *log* 128

$\therefore$ This is in the form of *log*N and N = 128

iii) $\frac{1}{3}$ *log* 512 = *log* $(512)^{\frac{1}{3}}$ = *log* $(8^3)^{\frac{1}{3}}$ = *log* 8

$\therefore$ This is in the form of $l$ogN and N = 8

iv) $3\ log\ 5 + 2\ log\ 3 - log\ 45 = log\ 5^3 + log\ 3^2 - log\ 45$

$= log\ 125 + log\ 9 - log\ 45$

$= log\ \frac{125 \times 9}{45}$

$= log\ 25$

$\therefore$ This is in the form of $l$ogN, Here N = 25

(OR)

b) Write the following into set form and find A $\cup$ B, A $\cap$ B, A – B; where

A = $\{$ x/x is a two digit number whose sum of the digits is 9 $\}$

B = $\{$ x/x is a two digit number which is a multiple of 6 $\}$

A: A = $\{18, 27, 36, 45, 54, 63, 72, 81, 90\}$

B = $\{12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96\}$

A$\cup$ B = $\{12, 18, 24, 27, 30, 36, 42, 45, 48, 54, 60, 63, 66, 72, 78, 81, 84, 90, 96\}$

A $\cap$ B = $\{18, 36, 54, 72, 90\}$

A – B = $\{27, 45, 63, 81\}$

11. a) On dividing $x^3 - 3x^2 + 5x - 3$ by g(x), the quotient and remainders are (x – 3) and (7x – 9) respectively then find g(x).

A: Let $p(x) = x^3 - 3x^2 + 5x - 3$

Quotient $q(x) = x - 3$

Remainder $r(x) = 7x - 9$

By the division algorithm,

$p(x) = g(x)q(x) + r(x)$

$x^3 - 3x^2 + 5x - 3 = g(x)(x - 3) + (7x - 9)$

$\Rightarrow x^3 - 3x^2 + 5x - 3 - 7x + 9 = g(x)(x - 3)$

$\Rightarrow g(x)(x - 3) = x^3 - 3x^2 - 2x + 6$

$\Rightarrow g(x) = \frac{x^3 - 3x^2 - 2x + 6}{x - 3}$

$$
\begin{array}{r|l}
x - 3 \;)\; x^3 - 3x^2 - 2x + 6 & (x^2 - 2 \\
\underline{x^3 - 3x^2} & \\
0 - 2x + 6 & \\
\underline{-2x + 6} & \\
0 &
\end{array}
$$

$\therefore$ $g(x) = x^2 - 2$

(OR)

b) A hemispherical bowl of internal radius 15 cm. contains a liquid is to be filled into cylinderical bottles of diameter 5 cm. and height 6 cm. How many bottles are need to empty the bowl?

A: Internal radius of hemispherical bowl (r) = 15 cm

volume of the liquide in the bowl = $\frac{2}{3}\Pi r^3$

$$= \frac{2}{3} \times \Pi \times 15^3 \text{ cu.cm}$$

Diameter of the cylindrical bottle (d) = 5 cm

Radius of the cylindrical bottle (r) = $\frac{d}{2} = \frac{5}{2}$ cm

Height of the cylindrical bottle (h) = 6 cm

$$\text{volume of a bottle} = \Pi \times \frac{5}{2} \times \frac{5}{2} \times 6 \text{ cu.cm.}$$

$$\text{No.of bottles required to fill the liquid} = \frac{\text{volume of liquid in the bowl}}{\text{volume of a bottle}}$$

$$= \frac{\frac{2}{3} \times \Pi \times 15 \times 15 \times 15}{\Pi \times \frac{5}{2} \times \frac{5}{2} \times 6}$$

$$= \frac{2 \times 15 \times 15 \times 15 \times 2 \times 2}{5 \times 5 \times 6}$$

$$= 15 \times 3 \times 2 \times 2$$

$$= 180$$

12. a) The sum of the 5th and 10th terms of an A.P. is 75 and 8th and 10th terms is 135. Find first four terms of the A.P.

A: Let the first term in the A.P. is 'a' and common difference is 'd'

5^{th} term $t_5 = a + 4d$

10^{th} term $t_{10} = a + 9d$

8^{th} term $t_8 = a + 7d$

$t_5 + t_{10} = (a + 4d) + (a + 9d) = 2a + 13d$

By the sum, $t_5 + t_{10} = 75$

$\therefore 2a + 13d = 75$ .....(1)

$t_8 + t_{10} = (a + 7d) + (a + 9d) = 2a + 16d$

By the sum, $t_8 + t_{10} = 135$

$\therefore 2a + 16d = 135$ .....(2)

(2) – (1) We get $2a + 16d = 135$

$2a + 13d = 75$

$3d = 60$

$$d = \frac{60}{3} = 20$$

From (1), $2a + 13 \times 20 = 75$

$$2a = 75 - 260$$

$$a = -\frac{185}{2}$$

$$\therefore \text{ 1st term } a = -\frac{185}{2}$$

$$\text{2nd term } a + d = -\frac{185}{2} + 20 = -\frac{145}{2}$$

$$\text{3rd term } a + 2d = -\frac{185}{2} + 2 \times 20 = -\frac{105}{2}$$

$$\text{4th term } a + 3d = -\frac{185}{2} + 3 \times 20 = -\frac{65}{2}$$

(OR)

b) A motor boat whose speed is 18 km/hr in still water if takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream?

A: Let the speed of the stream be x km/hr

$\therefore$ The speed of the boat upstream = (18 – x) km/hr

and the speed of the boat downstream = (18 + x) km/hr.

$$\text{The time taken to go upstream} = \frac{\text{distance}}{\text{speed}} = \frac{24}{(18 - x)} \text{ hr.}$$

similarly, the time taken to go downstream $= \frac{24}{(18 + x)}$ hr.

By the sum, $\frac{24}{18 - x} - \frac{24}{18 + x} = 1$

$24(18 + x) - 24(18 - x) = (18 - x)(18 + x)$

$\Rightarrow 24 \times 18 + 24 \times x - 24 \times 18 + 24 \times x = 18 \times 18 - x \times x$

$\Rightarrow x^2 + 48x - 324 = 0$

By the formula

$$x = \frac{-48 \pm \sqrt{48^2 - 4 \times 1 \times (-324)}}{2 \times 1}$$

$$= \frac{-48 \pm \sqrt{3600}}{2}$$

$$= \frac{-48 \pm 60}{2}$$

$$= \frac{-48 + 60}{2} \text{ or } \frac{-48 - 60}{2}$$

$x = 6$ (or) -54

Speed cannot be negative $\Rightarrow$ $x = 6$

$\therefore$ speed of the stream = 6 km/hr

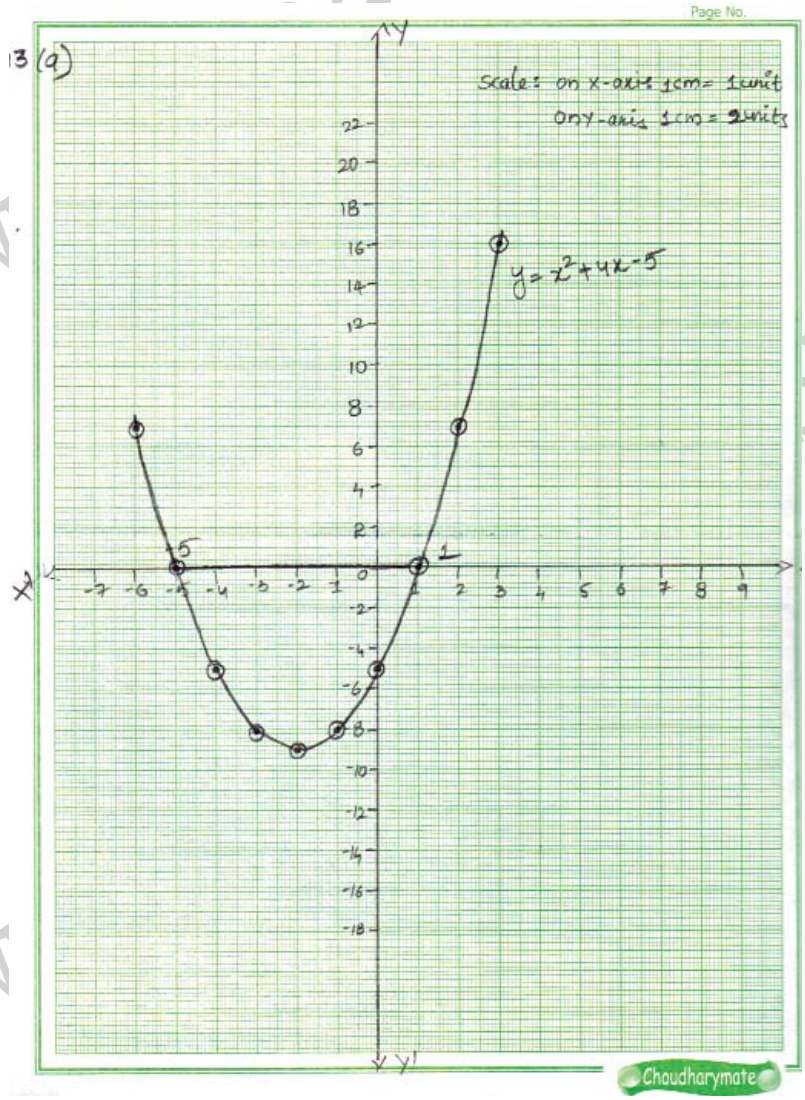
13. a) Draw the graph for $x^2 + 4x - 5$ and show that the x – coordinates of point of intersection of X – axis is zeros of that polynomial.

A: Given polynomial is $x^2 + 4x - 5$

let $y = x^2 + 4x - 5$

Table for $y = x^2 + 4x - 5$ is

x	0	1	2	3	–1	–2	–3	–4	–5	6
x^2	0	1	4	9	1	4	9	16	25	36
4x	0	4	8	12	–4	–8	–12	–16	–20	–24
–5	–5	–5	–5	–5	–5	–5	–5	–5	–5	–5
y	–5	0	7	16	–8	–9	–8	–5	0	7



From the graph, solution set is {1, –5}

(OR)

b) Solve the pair of equations graphically 2x + y − 6 = 0 and 4x − 2y − 4 = 0.

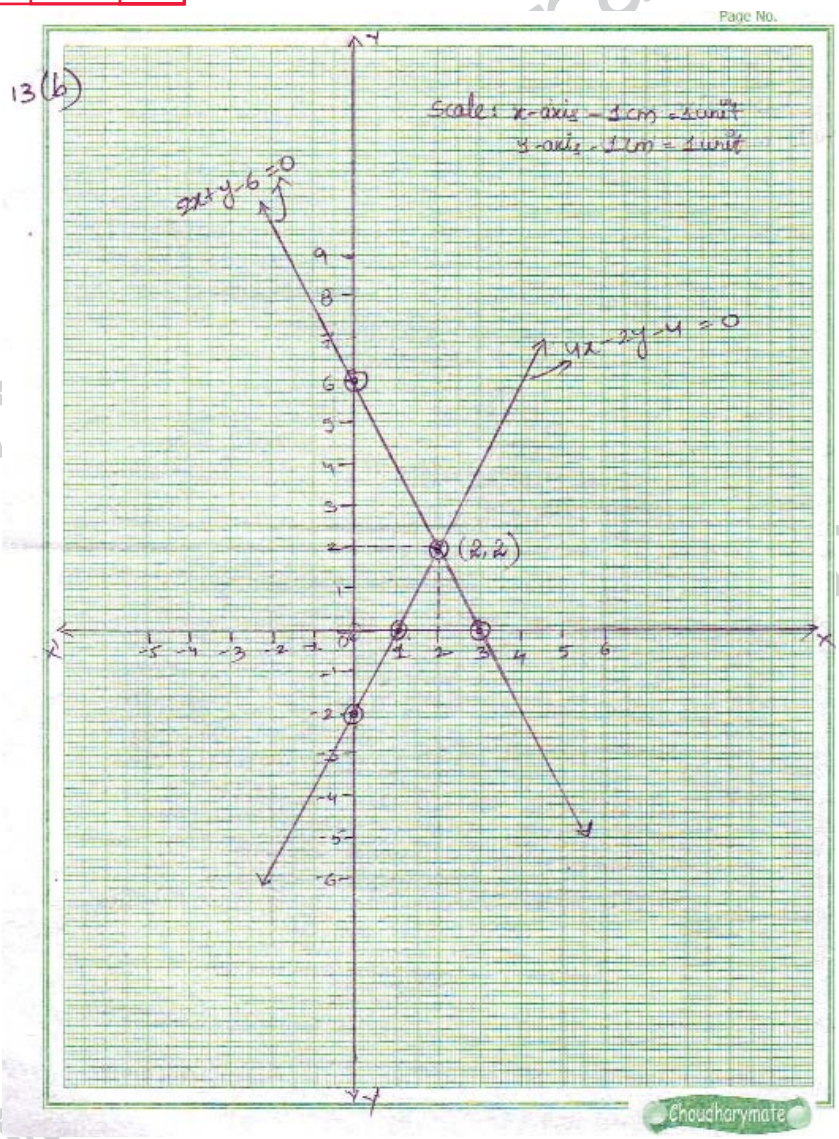
A: Given equations are 2x + y − 6 = 0 and 4x − 2y − 4 = 0

Table for 2x + y − 6 = 0 (or) y = 6 − 2x is

x	0	3
y	6	0

Table for 4x − 2y − 4 = 0 (or) $y = \frac{4x - 4}{2}$ is

x	0	1
y	−2	0



From the graph the solution set is {2, 2}

PART – B ANSWERS

14–D; 15–C; 16–A; 17–B; 18–C; 19–D; 20–B; 21–A; 22–C; 23–D; 24–D; 25–B; 26–C; 27–B; 28–D; 29–A; 30–D; 31–A; 32–D; 33–C.

Writer: S.V.S. Suryanarayana Murthy