BOARD OF SECONDARY EDUCATION (AP)

SUMMATIVE ASSESSMENT – I

TENTH CLASS MATHEMATICS MODEL PAPER

PAPER – I (ENGLISH VERSION)

Time: 2 hrs. 45 mins. **PART – A & B** **Max.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 in a 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. If $\log_{\sin 60^\circ} a = \tan 45^\circ$ then find the value of 'a'.

2. Find the number of zeroes of the quotient when $2x^4 - 5x^3 + 8x^2 + 3x + 1$ is divided by $x^2 + x - 1$ (Find it without division).

3. Solve the following pair of linear equations using elimination method $2x + y = 3$ and $x - y = 1$.

4. The lateral surface area of a cylinder is equal to the curved surface area of a cone. If the radius be the same, find the ratio of the height of the cylinder and slant height of the cone.

SECTION – II

Instructions:

i) Answer ALL the questions.

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

5. Draw Venn diagrams for i) $A \cup B$ such that $A \cup B = B$ ii) $A - B$

6. Give examples of polynomials p(x), g(x), q(x) and r(x), which satisfy the division algorithm and

i) deg. p(x) = deg. q(x)

ii) deg. q(x) = deg. r(x)

7. The larger of two complementary angles exceeds the smaller by 16°, find the angles.

8. "Rohan's mother is 26 years older than him. The product of their ages after 3 years will be 360 years. We need to find Rohan's present age". Represent the situation in the form of quadratic equation.

9. Find the volume and total surface area of a hemisphere of radius 4.2 cm.

SECTION – III

Instructions:

i) Answer ALL the questions.

ii) Each question carries FOUR Marks. **4 × 4 = 16**

iii) Each question has Internal Choice.

10. a) Prove that $\sqrt{5} + \sqrt{7}$ is an irrational.

(OR)

b) Verify that 3, –1, $-\frac{1}{3}$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$ and then verify the relationship between the zeroes and the coefficients.

11. a) If A = {x : x is a letter in the word eenadu}, B = {x : x is a letter in the word prathibha} then find

i) $A \cup B$ ii) $A \cap B$ iii) $A - B$ iv) $B - A$

(OR)

b) A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

12. a) Spherical marbles of diameter 1.4 cm are dropped into a cylindrical beaker of diameter 7 cm, which contains some water. Find the number of marbles that should be dropped into the beaker, so that the water level raises by 5.6 cm.

(OR)

b) How many silver coins, 1.75 cm in diameter and thickness 2 mm need to be melted to form a cuboid of dimensions 5.5 cm × 10 cm × 3.5 cm?

13. a) Find the zeroes of the polynomial $p(x) = x^2 - x - 6$ by using graph.

(OR)

b) Solve the equations graphically $2x + y = 5$, $3x - 2y = 4$.

www.eenadupratibha.net

Time : 30 Minutes **PART – B** **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 rewriting 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. The L.C.M. of 72 and 108 is ( )

A) 36 B) 72 C) 108 D) 216

15. $\frac{9}{15}$ = ( )

A) Non terminating and non-recurring decimal.

B) Non terminating and recurring decimal.

C) Terminating decimal.

D) None

16. $2^{2 + \log_2 5}$ ( )

A) 4 B) 9 C) $\frac{4}{5}$ D) 20

17. If n(A) = 25, n(B) = 15, n(A $\cup$ B) = 30, then n(A $\cap$ B) = ( )

A) 5 B) 10 C) 15 D) 25

18. Match the roster form with set builder form. ( )

i) $\{1, 2, 3, 6\}$ a) $\{x : x \text{ is an odd number less than } 6\}$

ii) $\{2, 3, 5\}$ b) $\{x : x \text{ is a factor of } 6\}$

iii) $\{1, 3, 5\}$ c) $\{x : x \text{ is a prime number less than } 6\}$

A) i - a, ii - b, iii - c B) i - a, ii - c, iii - b

C) i - b, ii - c, iii - a D) i - b, ii - a, iii - c

19. If A $\cap$ B = A and A $\cup$ B = B then ( )

A) A $\subset$ B B) B $\subset$ A C) A = ϕ D) $\phi = \mu$

20. The points of intersection of the graph of $p(x) = x^2 + 3x - 4$ with X – axis are ( )

A) (–1, 0), (4, 0) B) (1, 0), (4, 0) C) (–1, 0), (–4, 0) D) (1, 0), (–4, 0)

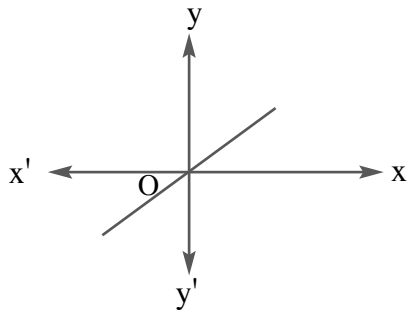
21. One zero of the polynomial $x^{2017} + (-1)^{2018}$ is ( )

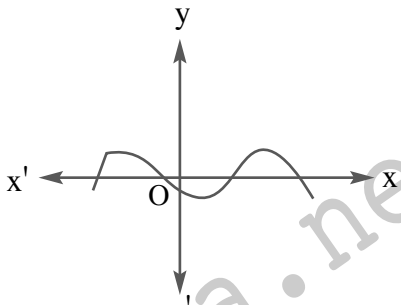
A) 0 B) –1 C) 1 D) 2017

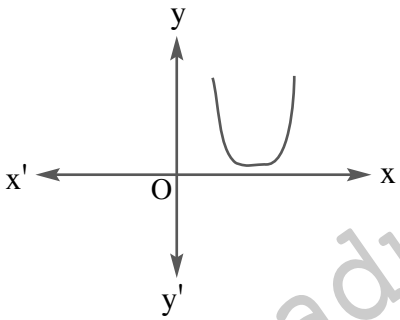
22. If the remainder of $ax^3 + 9x^2 + 4x - 10$, when dividing by (x – 3) is 2, then a = ( )

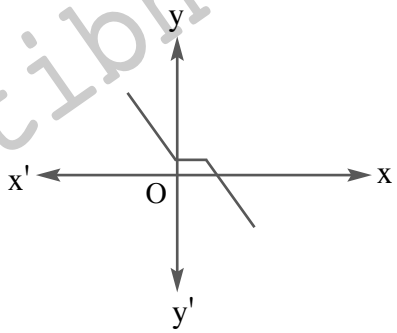
A) 3 B) –3 C) 2 D) –2

23. Which of the following represent a quadratic polynomial? ( )

A) 

B) 

C) 

D) 

24. If the pair of equations $2x + py = -5$ and $3x + 3y = -6$ has a unique solution then ( )

A) $p = 1$ B) $p = 2$ C) $p \neq 2$ D) $p \neq 1$

25. The equations $2x - y = 4$, $4x - 2y = 6$ has ..... solutions. ( )

A) no B) one C) two D) infinitely many

26. The value of 'k' for which the pair of equations $3x + 4y + 2 = 0$ and $9x + 12y + k = 0$ represent co–incident lines is ..... ( )

A) 3 B) 6 C) 9 D) 12

27. The equation whose roots are the reciprocal of the roots of $5x^2 - 7x + 13 = 0$ is ..... ( )

A) $13x^2 + 7x + 5 = 0$ B) $13x^2 - 7x + 5 = 0$

C) $5x^2 + 7x + 13 = 0$ D) $5x^2 - 7x - 13 = 0$

28. If sum and product of roots is $\sqrt{3}$ and $-\sqrt{3}$ respectively then the equation is ..... ( )

A) $x^2 - 3 = 0$ B) $x^2 - 9 = 0$

C) $x^2 + \sqrt{3}x - \sqrt{3} = 0$ D) $x^2 - \sqrt{3}x - \sqrt{3} = 0$

29. If one root of $x^2 - 8x + k = 0$ is three times the other, then $k =$ ( )

A) 8 B) –8 C) 12 D) –12

30. A heap of rice is in the form of a cone of diameter 12 m and height 8 m. The volume of the heap is ..... m^3. ( )

A) 301.44 B) 188.4 C) 565.2 D) 904.32

31. A right circular cylinder has base radius 14 cm and height 21 cm. The total surface area of the cylinder is ..... cm^2. ( )

A) 1848 B) 616 C) 3080 D) 12936

www.eenadupratibha.net

32. A cylinder and cone have bases of equal radii and are equal heights. The ratio of their volumes is ..... ( )

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

33. The curved surface area of a cone is 4070 cm^2 and its diameter is 70 cm. Then its slant height is ..... ( )

A) 35 cm B) 36 cm C) 37 cm D) 38 cm

www.eenadupratibha.net

www.eenadupratibha.net

ANSWERS

PART – A

SECTION – I

1. Given that $\log_{\sin 60^\circ} a = \tan 45^\circ$

A: We know that $\sin 60^\circ = \frac{\sqrt{3}}{2}$, $\tan 45^\circ = 1$

$\therefore \log_{\frac{\sqrt{3}}{2}} a = 1 \Rightarrow a = \left(\frac{\sqrt{3}}{2}\right)^1 = \frac{\sqrt{3}}{2}$

2. Find the number of zeroes of the quotient when $2x^4 - 5x^3 + 8x^2 + 3x + 1$ is divided by $x^2 + x - 1$ (Find it without division).

A: From the given data

degree of dividend = 4

degree of divisor = 2

it follows the degree of quotient is 2 (4 – 2)

$\therefore$ Number of zeroes of the quotient is 2

3. Solve the following pair of linear equations using elimination method $2x + y = 3$ and $x - y = 1$.

A: Given equations are $2x + y = 3$ and $x - y = 1$

$$\begin{array}{r} 2x + y = 3 \\ x - y = 1 \\ \hline 3x = 4 \end{array}$$

by adding $\Rightarrow x = \frac{4}{3}$

substitute the value of x in $x - y = 1$, we get

$$\frac{4}{3} - y = 1 \Rightarrow \frac{4}{3} - 1 = y$$

$$\therefore y = \frac{1}{3}$$

4. The lateral surface area of a cylinder is equal to the curved surface area of a cone. If the radius be the same, find the ratio of the height of the cylinder and slant height of the cone.

A: Let the radius of cylinder and cone be 'r'

height of the cylinder = h

slant height of the cone = l

L.S.A. of cylinder = $2\pi rh$

C.S.A. of cone = πrl

by the sum $2\pi rh = \pi rl$

$$\Rightarrow \frac{h}{l} = \frac{1}{2}$$

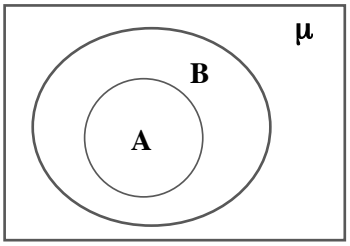
$\therefore$ height : slant height = 1 : 2

SECTION – II

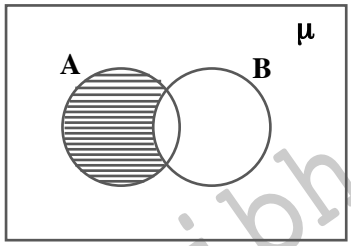
5. Draw Venn diagrams for i) A ∪ B such that A ∪ B = B

ii) A – B

A: i)



ii)



6. Give examples of polynomials p(x), g(x), q(x) and r(x), which satisfy the division algorithm and

i) deg. p(x) = deg. q(x)

ii) deg. q(x) = deg. r(x)

A: Any two examples satisfying given conditions for example

i) $p(x) = 6x^2 + 9x + 12$; $g(x) = 3$

$q(x) = 2x^2 + 3x + 4$; $r(x) = 0$

ii) $p(x) = x^3 + 4x^2 + 5x + 10$; $g(x) = x^2 + 2$

$q(x) = x + 4$; $r(x) = 3x + 2$

7. The larger of two complementary angles exceeds the smaller by 16°, find the angles.

A: Let the larger angle be 'x' and the smaller angle be 'y'. Angles are complementary.

$x + y = 90^\circ \longrightarrow (1)$

The larger angle 16° more than the smaller angle

$x = y + 16^\circ$

$\Rightarrow x - y = 16^\circ \longrightarrow (2)$

$(1) + (2) \Rightarrow x + y = 90^\circ$

$x - y = 16^\circ$

$2x = 106^\circ$

$\Rightarrow x = 53^\circ$

$y = 53^\circ - 16^\circ = 37^\circ$

8. "Rohan's mother is 26 years older than him. The product of their ages after 3 years will be 360 years. We need to find Rohan's present age". Represent the situation in the form of quadratic equation.

A: Let the present age of Rohan be 'x' years

$\Rightarrow$ the age of his mother $= (x + 26)$ years

after 3 years, age of Rohan $= (x + 3)$ years

after 3 years, age of his mother $= x + 26 + 3 = (x + 29)$ years

after 3 years, product of their ages $= (x + 3)(x + 29) = 360$

$\Rightarrow x^2 + 32x - 273 = 0$

www.eenadupratibha.net

9. Find the volume and total surface area of a hemisphere of radius 4.2 cm.

A: Radius of hemisphere r = 4.2 cm

Volume of hemisphere $V = \frac{2}{3}\pi r^3$

$= \frac{2}{3} \times \frac{22}{7} \times 4.2 \times 4.2 \times 4.2$

$= 155.23 \text{ cm}^3$ (approximately)

Total surface area $A = 3\pi r^2$

$= 3 \times \frac{22}{7} \times 4.2 \times 4.2$

$= 166.32 \text{ cm}^2$

SECTION – III

10. a) Prove that $\sqrt{5} + \sqrt{7}$ is an irrational.

A: Let us suppose that $\sqrt{5} + \sqrt{7}$ be rational let $\sqrt{5} + \sqrt{7} = \frac{a}{b}$, where a, b are integers and $b \neq 0$.

$\therefore \sqrt{5} = \frac{a}{b} - \sqrt{7}$

squaring on both sides, we get

$(\sqrt{5})^2 = \left(\frac{a}{b} - \sqrt{7}\right)^2$

$\Rightarrow 5 = \frac{a^2}{b^2} + 7 - 2.\frac{a}{b}.\sqrt{7}$

$\Rightarrow 2.\frac{a}{b}\sqrt{7} = \frac{a^2}{b^2} + 7 - 5$

$= \frac{a^2 + 2b^2}{b^2}$

$\Rightarrow \sqrt{7} = \frac{a^2 + 2b^2}{b^2} \times \frac{b}{2a} = \frac{a^2 + 2b^2}{2ab}$

Since a, b are integers, $\frac{a^2 + 2b^2}{2ab}$ is rational and so, $\sqrt{7}$ is rational.

This contradicts the fact that $\sqrt{7}$ is irrational hence $\sqrt{5} + \sqrt{7}$ is irrational.

(OR)

b) Verify that 3, –1, $-\frac{1}{3}$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$ and then verify the relationship between the zeroes and the coefficients.

A: Comparing the given polynominal with $ax^3 + bx^2 + cx + d$, we get a = 3, b = –5, c = –11, d = –3.

$p(x) = 3x^3 - 5x^2 - 11x - 3$

$p(3) = 3(3)^3 - 5(3)^2 - 11(3) - 3$

$= 81 - 45 - 33 - 3$

$= 81 - 81 = 0$

$p(-1) = 3(-1)^3 - 5(-1)^2 - 11(-1) - 3$

$= -3 - 5 + 11 - 3$

$= 11 - 11$

$= 0$

$p\left(-\frac{1}{3}\right) = 3\left(-\frac{1}{3}\right)^3 - 5\left(-\frac{1}{3}\right)^2 - 11\left(-\frac{1}{3}\right) - 3$

$= -\frac{1}{9} - \frac{5}{9} + \frac{11}{3} - 3$

$= \frac{-33 + 33}{9}$

$= 0$

$\therefore 3, -1$ and $-\frac{1}{3}$ are zeroes of $3x^3 - 5x^2 - 11x - 3$

Let $\alpha = 3, \beta = -1$ and $\gamma = -\frac{1}{3}$

$\alpha + \beta + \gamma = (3) + (-1) + \left(-\frac{1}{3}\right)(3)$

$= \frac{5}{3}$

$= \frac{-(-5)}{3} = \frac{-b}{a}$

$\alpha\beta + \beta\gamma + \gamma\alpha = (3)(-1) + (-1)\left(-\frac{1}{3}\right) + \left(-\frac{1}{3}\right)(3)$

$= -3 + \frac{1}{3} - 1$

$= -\frac{11}{3} = \frac{c}{a}$

$\alpha . \beta . \gamma = (3) \times (-1) \times \left(-\frac{1}{3}\right) = 1 = \frac{-(-3)}{3} = -\frac{d}{a}$

11. a) If A = {x : x is a letter in the word eenadu}, B = {x : x is a letter in the word prathibha} then find

i) $A \cup B$ ii) $A \cap B$ iii) $A - B$ iv) $B - A$

A: $A = \{e, n, a, d, u\}$; $B = \{p, r, a, t, h, i, b\}$

i) $A \cup B = \{e, n, a, d, u\} \cup \{p, r, a, t, h, i, b\}$

$= \{e, n, a, d, u, p, r, t, h, i, b\}$

ii) $A \cap B = \{e, n, a, d, u\} \cap \{p, r, a, t, h, i, b\}$

$= \{a\}$

iii) $A - B = \{e, n, a, d, u\} - \{p, r, a, t, h, i, b\}$

$= \{e, n, d, u\}$

iv) $B - A = \{p, r, a, t, h, i\ b\} - \{e, n, a, d, u\}$

$= \{p, r, t, h, i, b\}$

(OR)

b) A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

A: Let the speed of the train be 'x' km/hr, distance travelled by the train = 360 km

$$\text{time } (t_1) = \frac{\text{distance}}{\text{speed}} = \frac{360}{x} \longrightarrow (1)$$

If speed of train increased 5 km/hr

$$\text{time } (t_2) = \frac{360}{x+5} \longrightarrow (2)$$

difference between two timings = 1 hr

$$\frac{360}{x} - \frac{360}{x+5} = 1$$

$$\Rightarrow \frac{360(x+5) - 360x}{x(x+5)} = 1$$

$$\Rightarrow 360x + 1800 - 360x = x^2 + 5x$$

$$\Rightarrow x^2 + 5x - 1800 = 0$$

$$\Rightarrow x^2 + 45x - 40x - 1800 = 0$$

$$\Rightarrow x(x+45) - 40(x+45) = 0$$

$$\Rightarrow (x+45)(x-40) = 0$$

$$\Rightarrow x = -45 \text{ or } x = 40$$

speed never be negative

$\therefore$ Speed of the train (x) = 40 km/hr

12. a) Spherical marbles of diameter 1.4 cm are dropped into a cylindrical beaker of diameter 7 cm, which contains some water. Find the number of marbles that should be dropped into the beaker, so that the water level raises by 5.6 cm.

A: Diameter of cylinder $(d_1) = 7$ cm

Radius of cylinder $(r_1) = \frac{d_1}{2} = \frac{7}{2} = 3.5$ cm

Diameter of each spherical marble = 1.4 cm

Radius of spherical marble $r_2 = \frac{d_2}{2} = \frac{1.4}{2} = 0.7$ cm

Since marbles are dropped into beakers, water level raises by 5.6 cm

Height of cylinder $(h_1) = 5.6$ cm

Volume of water in the beaker $= \pi r_1^2 h = \pi \times (3.5)^2 \times 5.6$

Volume of each sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3} \times \pi \times (0.7)^3$

No.of marbles that should be dropped in beaker $= \frac{\text{Volume of water}}{\text{Volume of sphere}}$

$$= \frac{\Pi \times 3.5 \times 3.5 \times 5.6}{\frac{4}{3} \times \Pi \times 0.7 \times 0.7 \times 0.7}$$

$$= \frac{3 \times 35 \times 35 \times 56}{4 \times 7 \times 7 \times 7}$$

$$= 3 \times 5 \times 5 \times 2$$

$$= 150$$

(OR)

b) How many silver coins, 1.75 cm in diameter and thickness 2 mm need to melted to form a cuboid of dimensions 5.5 cm × 10 cm × 3.5 cm?

A: Silver coins are in the shape of cylinder

Height of the coin = thickness of the coin = h_1 = 2 mm

= 0.2 cm

Diameter of the coin (d) = 1.75 cm

Radius of the coin (r) = $\frac{1.75}{2}$

Let the number of coins melted to form a cuboid = x

Length of the required cuboid l = 5.5 cm

Breadth of the required cuboid b = 10 cm

Height of the required cuboid h_2 = 3.5 cm

Now Volume of x coins = Volume of cuboid

$$\Rightarrow x \times \Pi r^2 h_1 = lbh_2$$

$$\Rightarrow x = \frac{lbh_2}{\Pi r^2 h_1}$$

$$= \frac{5.5 \times 10 \times 3.5}{\frac{22}{7} \times \frac{1.75}{2} \times \frac{1.75}{2} \times 0.2}$$

$$= \frac{5.5 \times 10 \times 3.5 \times 7 \times 2 \times 2}{22 \times 1.75 \times 1.75 \times 0.2} = 400$$

No.of coins = 400

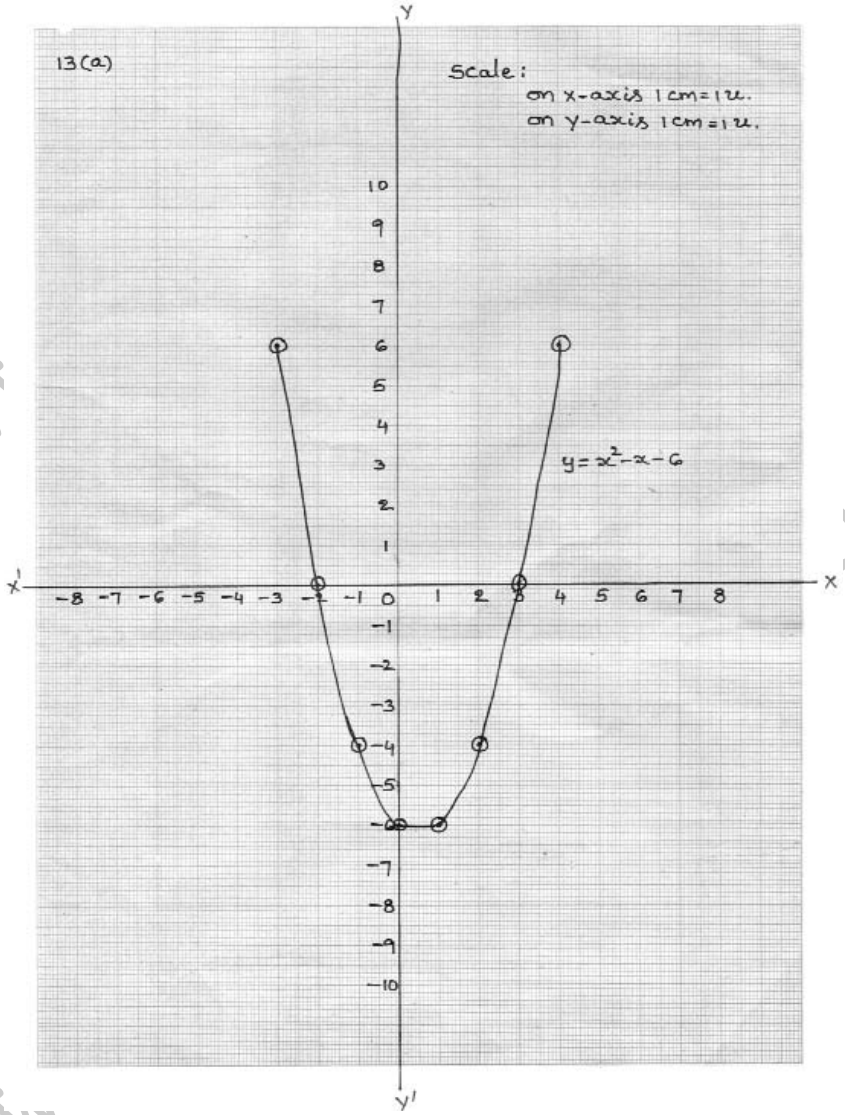
www.eenadupratibha.net

13. a) Find the zeroes of the polynomial $p(x) = x^2 - x - 6$ by using graph.

A: Let $y = x^2 - x - 6$

Table for $y = x^2 - x - 6$

x	–3	–2	–1	0	1	2	3	4
x^2	9	4	1	0	1	4	9	16
–x	3	2	1	0	–1	–2	–3	–4
–6	–6	–6	–6	–6	–6	–6	–6	–6
y	6	0	–4	–6	–6	–4	0	6
(x, y)	(–3, 6)	(–2, 0)	(–1, –4)	(0, –6)	(1, –6)	(2, –4)	(3, 0)	(4, 6)



Scale: on X – axis 1 cm = 1 unit

on Y – axis 1 cm = 1 unit

The graph parabola cuts X – axis at –2 and 3

$\therefore$ Solution set = $\{-2, 3\}$

(OR)

b) Solve the equations graphically $2x + y = 5, 3x - 2y = 4$

Given equations $2x + y = 5$ and $3x - 2y = 4$

Table for $2x + y = 5$

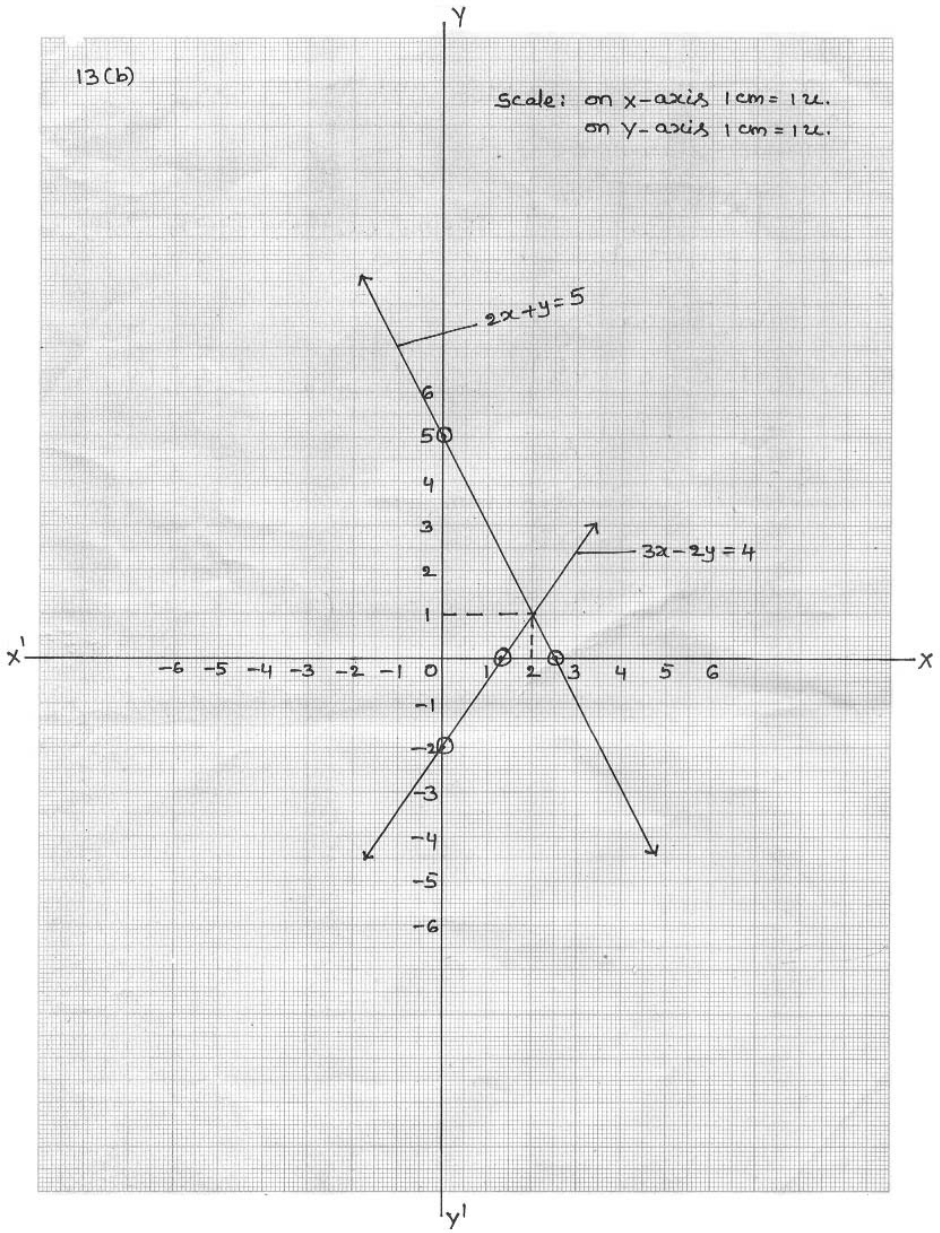
x	0	5/2
y	5	0

Points (x, y) are (0, 5), (5/2, 0)

Table for $3x - 2y = 4$

x	0	4/3
y	−2	0

Points (x, y) are (0, −2), (4/3, 0)



Scale: on X – axis 1 cm = 1 unit

on Y – axis 1 cm = 1 unit

From the graph solution set = {2, 1}

PART – B

ANSWERS

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

Writer: T.S.V.S. Suryanarayana Murthy

www.eenadupratibha.net