N 619

Seat No. [ ][ ][ ][ ][ ]

2024 III 13 1100 -N 619- MATHEMATICS (71) ALGEBRA PART I (E)

(REVISED COURSE)

Time : 2 Hours (Pages 11) Max. Marks : 40

Note :— (*i*) *All* questions are compulsory.

(*ii*) Use of a calculator is not allowed.

(*iii*) The numbers to the right of the questions indicate full marks.

(*iv*) In case of MCQs [Q. No. 1(A)] only the first attempt will be evaluated and will be given credit.

1. (A) Choose the correct alternative from given : 4

(*i*) If 3 is one of the root of the quadratic equation $kx^2 - 7x + 12 = 0$, then k = ...

(A) 1

(B) –1

(C) 3

(D) –3

P.T.O.

(*ii*) To draw the graph of $x + 2y = 4$, find x when $y = 1$:

(A) 1

(B) 2

(C) –2

(D) 6

(*iii*) For an A.P., $t_7 = 4$, $d = -4$, then a = ...

(A) 6

(B) 7

(C) 20

(D) 28

(*iv*) In the format of GSTIN, there are ..... alpha-numerals.

(A) 9

(B) 10

(C) 15

(D) 16

(B) Solve the following subquestions : 4

(*i*) If $17x + 15y = 11$ and $15x + 17y = 21$, then find the value of $x - y$.

(*ii*) Find first term of the sequence $t_n = 3n - 2$.

(*iii*) If the face value of a share is ₹ 100 and market value is ₹ 150. If rate of brokerage is 2%, find brokerage paid on one share.

(*iv*) Two digit numbers are formed using digits 2, 3 and 5 without repeating a digit. Write the sample space.

2. (A) Complete the following activities and rewrite it (any *two*) : 4

(*i*) If (0, 2) is the solution of $2x + 3y = k$, then to find the value of k, complete the following activity :

Activity :

(0, 2) is the solution of the equation $2x + 3y = k$.

Put $x =$ ☐ and $y =$ ☐ in the given equation;

$\therefore \quad 2 \times$ ☐ $+ 3 \times 2 = k$

$\therefore \quad 0 + 6 = k$

$\therefore \quad k =$ ☐

P.T.O.

(ii) If 2 and 5 are the roots of the quadratic equation, then complete the following activity to form quadratic equation :

Activity :

Let $\alpha = 2$ and $\beta = 5$ are the roots of the quadratic equation.

Then quadratic equation is :

$$x^2 - (\alpha + \beta)x + \alpha\beta = 0$$

$$\therefore \quad x^2 - (2 + \square)x + \square \times 5 = 0$$

$$\therefore \quad x^2 - \square x + \square = 0$$

(iii) Two coins are tossed simultaneously. Complete the following activity to write the sample space and the given events A and B in the set form :

Event A : To get at least one head.

Event B : To get no head.

Activity :

Two coins are tossed simultaneously.

∴ Sample space is

S = {□, HT, TH, □}

Event A : To get at least one head.

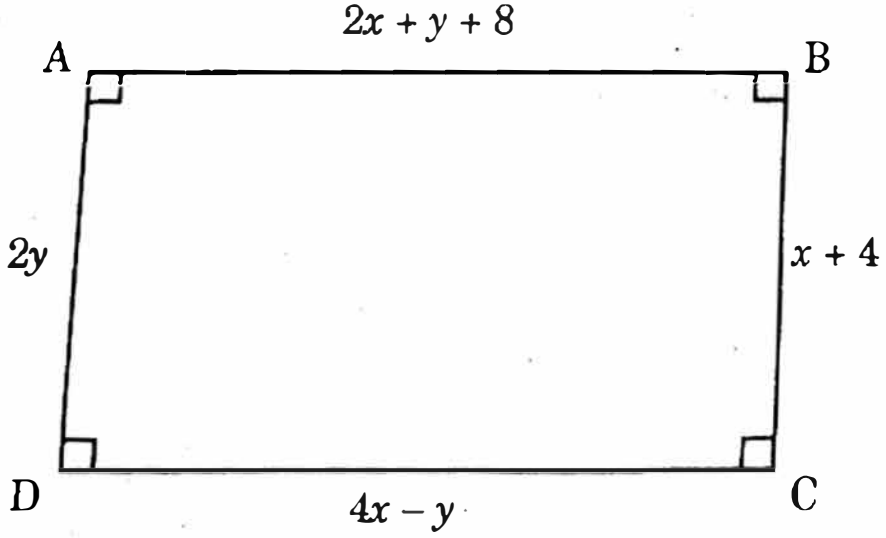
∴ A = {□, HT, TH}

Event B : To get no head.

∴ B = {□}

(B) Solve the following subquestions (any *four*) : **8**

(*i*) □ABCD is a rectangle. Write two simultaneous equations using information given below in the diagram, in the form of $ax + by = c$:



P.T.O.

(ii) Solve the following quadratic equation using factorisation method :

$$x^2 + x - 20 = 0$$

(iii) Find the 19th term of the following A.P. :

7, 13, 19, 25, ...

(iv) A card is drawn from well shuffled pack of 52 playing cards. Find the probability that the card drawn is a face card.

(v) The following table shows classification of number of workers and number of hours they work in software company. Prepare less than upper limit type cumulative frequency distribution table :

Number of hours daily	Number of workers
8–10	150
10–12	500
12–14	300
14–16	50

3. (A) **Complete the following activity and rewrite it (any one) : 3**

(i) The following frequency distribution table shows the classification of the number of vehicles and the volume of petrol filled in them. To find the mode of the volume of petrol filled, complete the following activity :

Class (Petrol filled in Liters)	Frequency (Number of Vehicles)
0.5–3.5	33
3.5–6.5	40
6.5–9.5	27
9.5–12.5	18
12.5–15.5	12

Activity :

From the given table,

Modal class = ☐

$\therefore$ Mode = ☐ + $\left[\frac{f_1 - f_0}{2f_1 - f_0 - \square}\right] \times h$

$\therefore$ Mode = $3.5 + \left[\frac{40 - 33}{2(40) - 33 - 27}\right] \times \square$

$\therefore$ Mode = $3.5 + \left[\frac{7}{80 - 60}\right] \times 3$

$\therefore$ Mode = ☐

$\therefore$ The mode of the volume of petrol filled is ☐.

P.T.O.

(*ii*) The total value (with GST) of remote controlled toy car is ₹ 2360. Rate of GST is 18% on toys. Complete the following activity to find the taxable value for the toy car :

Activity :

Total value for toy car with GST = ₹ 2360.

Rate of GST = 18%

Let taxable value for toy car be ₹ x

$\therefore$ GST = $\frac{18}{100} \times x$

$\therefore$ Total value for toy car = $\left(\begin{matrix}\text{taxable value} \\ \text{for toy car}\end{matrix}\right)$ + $\square$ ..... Formula

$\therefore$ 2360 = $\square$ + $\frac{\square}{100} \times x$

$\therefore$ 2360 = $\frac{\square}{100} \times x$

$\therefore$ 2360 × 100 = 118x

$\therefore$ $x = \frac{2360 \times 100}{\square}$

$\therefore$ Taxable value for toy car is ₹ $\square$

(B) Solve the following subquestions (any *two*) : **6**

(*i*) Solve the following quadratic equation by formula method :

$$3m^2 - m - 10 = 0$$

(*ii*) Solve the following simultaneous equations using Cramer's rule :

$$3x - 4y = 10,\ 4x + 3y = 5$$

(*iii*) 50 shares of face value ₹ 10 were purchased for market value of ₹ 25. Company declared 30% dividend on the shares, then find :

(1) Sum invested

(2) Dividend received

(3) Rate of return.

(*iv*) One coin and a die are thrown simultaneously. Find the probability of the following events :

Event A : To get a head and a prime number.

Event B : To get a tail and an odd number.

4. **Solve the following subquestions (any *two*) :** 8

(*i*) A tank can be filled up by two taps in 6 hours. The smaller tap alone takes 5 hours more than the bigger tap alone. Find the time required by each tap to fill the tank separately.

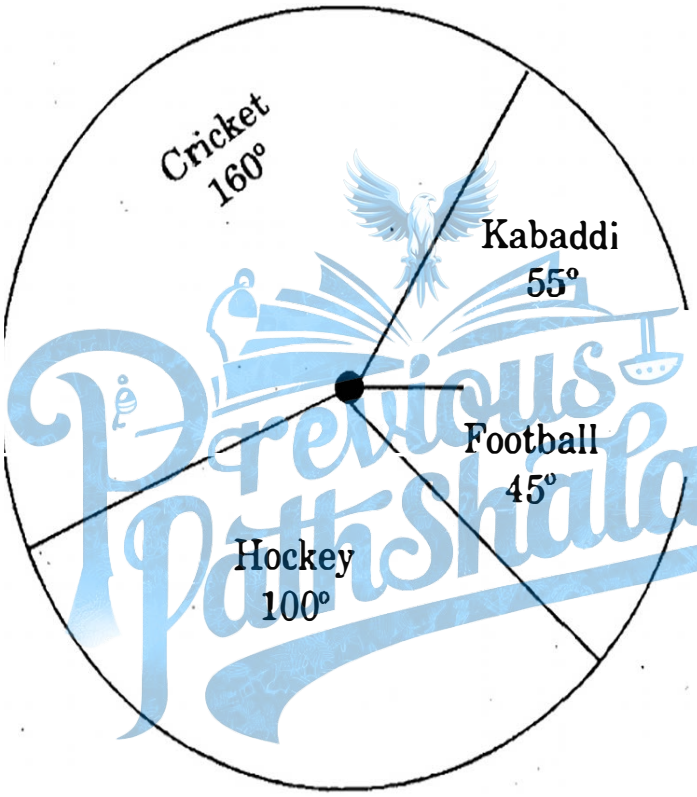
(*ii*) The following table shows the classification of percentage of marks of students and the number of students. Draw frequency polygon from the table without drawing histogram

Result (Percentage)	Number of Students
20–40	25
40–60	65
60–80	80
80–100	15

(*iii*) In a 'Mahila Bachat Gat' Kavita invested from the first day of month ₹ 20 on first day, ₹ 40 on second day and ₹ 60 on third day. If she saves like this, then what would be her total saving in the month of February 2020 ?

Solve the following subquestions (any *one*) : 3

(*i*) In the given figure, the pie diagram represents the amount spent on different sports by a school administration in a year. If the money spent on football is ₹ 9,000, answer the following questions :



(*a*) What is the total amount spent on sports ?

(*b*) What is the amount spent on cricket ?

(*ii*) Draw the graph of the equation $x + y = 4$ and answer the following questions

(*a*) Which type of triangle is formed by the line with X and Y-axes based on its sides.

(*b*) Find the area of that triangle.