N 913

Seat No. | | | | | | | |

2023 III 13 1100 **-N 913-** MATHEMATICS (71) ALGEBRA—PART I (E)

(REVISED COURSE)

Time : 2 Hours (Pages 9) 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.**

(*v*) **For every MCQ, four alternatives (A), (B), (C), (D) of answers are given. Alternative of correct answer is to be written in front of the subquestion number.**

1. (A) Choose the correct answer and write the alphabet of it in front of the subquestion number : 4

(*i*) To draw the graph of $4x + 5y = 19$, find y when $x = 1$:

(A) 4

(B) 3

(C) 2

(D) –3

P.T.O.

(*ii*) Out of the following equations which one is *not* a quadratic equation ?

(A) $x^2 + 4x = 11 + x^2$

(B) $x^2 = 4x$

(C) $5x^2 = 90$

(D) $2x - x^2 = x^2 + 5$

(*iii*) For the given A.P. $a = 3.5$, $d = 0$, then t_n = ...

(A) 0

(B) 3.5

(C) 103.5

(D) 104.5

(*iv*) If $n(A) = 2$, $P(A) = \frac{1}{5}$, then $n(S)$ = ?

(A) 10

(B) $\frac{5}{2}$

(C) $\frac{2}{5}$

(D) $\frac{1}{3}$

(B) Solve the following subquestions : 4

(*i*) Find the value of the following determinant :

$$\begin{vmatrix} 4 & 3 \\ 2 & 7 \end{vmatrix}.$$

(*ii*) Find the common difference of the following A.P. :

2, 4, 6, 8, ...

(*iii*) On certain article if rate of CGST is 9%, then what is the rate of SGST ?

(*iv*) If one coin is tossed, write the sample space 'S'.

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

(*i*) Complete the following activity; find the value of x :

$5x + 3y = 9$ ..... (I)

$2x - 3y = 12$ ..... (II)

Add equations (I) and (II)

$5x + 3y = 9$

$+ \underline{2x - 3y = 12}$

$7x =$ [ ]

$x =$ [ ] / [ ]

$x =$ [ ]

(*ii*) Complete the following activity to determine the nature of the roots of the quadratic equation $x^2 + 2x - 9 = 0$:

Solution :

Compare $x^2 + 2x - 9 = 0$ with $ax^2 + bx + c = 0$

$a = 1, b = 2, c =$ ☐

$\therefore \quad b^2 - 4ac = (2)^2 - 4 \times$ ☐ $\times$ ☐

$\Delta = 4 +$ ☐ $= 40$

$\therefore \quad b^2 - 4ac > 0$

$\therefore$ The roots of the equation are real and unequal.

(*iii*) Complete the following table using given information :

Sr. No.	FV	Share is at	MV
1.	₹ 100	Par	☐
2.	☐	Premium ₹ 500	₹ 575
3.	₹ 10	☐	₹ 5
4.	₹ 200	Discount ₹ 50	☐

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

(*i*) Solve the following simultaneous equations :

$$x + y = 4;\ 2x - y = 2$$

(*ii*) Write the following equation in the form $ax^2 + bx + c = 0$, then write the values of a, b, c :

$$2y = 10 - y^2.$$

(*iii*) Write an A.P. whose first term is $a = 10$ and common difference $d = 5$.

(*iv*) Courier service agent charged total ₹ 590 to courier a parcel from Nashik to Nagpur. In the tax invoice taxable value is ₹ 500 on which CGST is ₹ 45 and SGST is ₹ 45. Find the rate of GST charged for this service.

(*v*) Observe the following table and find Mean :

Assumed mean A = 300

Class	Class mark x_i	$d_i = x_i - A$ $d_i = x_i - 300$	Frequency f_i	Frequency × Deviation $f_i\ d_i$
200–240	220	–80	5	–400
240–280	260	–40	10	–400
280–320	300→ A	0	15	0
320–360	340	40	12	480
360–400	380	80	8	640
Total			$\Sigma f_i = 50$	$\Sigma f_i d_i = 320$

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

(*i*) Form a 'Road Safety Committee' of two, from 2 boys (B_1, B_2) and 2 girls (G_1, G_2).

Complete the following activity to write the sample space :

(*a*) Committee of 2 boys = $\{\square\}$

(*b*) Committee of 2 girls = $\{\square\}$

(*c*) Committee of one boy and one girl

= $\{\boxed{B_1G_1}, \boxed{B_1G_2}, \square, \square\}$

(*d*) ∴ Sample space (S) =

$\{(B_1B_2), (B_1G_1), \square, \square, (B_2G_2), (G_1G_2)\}$

(*ii*) Fill in the boxes with the help of given information :

Tax invoice of services provided (Sample)

Food Junction, Khed-Shivapur, Pune Invoice No. 58

Mob. No. 7588580000, email–ahar.khed@yahoo.com

GSTIN : 27AAAAA5555B1ZA Invoice Date 25 Feb., 2020

SAC	Food Items	Qty	Rate (in ₹)	Taxable amount	CGST		SGST	
9963	Coffee	1	20	20.00	2.5%	₹ 0.50	2.5%	[ ]
9963	Masala Tea	1	10	10.00	[ ]	₹ 0.25	2.5%	[ ]
9963	Masala Dosa	2	60	[ ]	2.5%	[ ]	2.5%	₹ 3.00
			Total	150.00		[ ]		₹ 3.75
						Grand Total	= ₹ 157.50	

(B) Solve the following sub-questions (any *two*) : **6**

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

$$4m + 6n = 54;\ 3m + 2n = 28$$

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

$$x^2 + 10x + 2 = 0$$

P.T.O.

(*iii*) A two digit number is formed with digits 2, 3, 5, 7, 9 without repetition. What is the probability of the following events ?

Event A : The number formed is an odd number.

Event B : The number formed is a multiple of 5.

(*iv*) The frequency distribution table shows the number of mango trees in a grove and their yield of mangoes. Find the median of data :

No. of Mangoes	No. of Trees
50–100	33
100–150	30
150–200	90
200–250	80
250–300	17

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

(*i*) If the first term of an A.P. is p, second term is q and last term is r, then show that sum of all terms is $(q + r - 2p) \times \frac{(p+r)}{2(q-p)}$.

(*ii*) Show the following data by a frequency polygon :

Electricity bill (₹)	Families
200–400	240
400–600	300
600–800	450
800–1000	350
1000–1200	160

(*iii*) The sum of the squares of five consecutive natural numbers is 1455. Find the numbers.

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

(*i*) Draw the graph of the equation $x + 2y = 4$. Find the area of the triangle formed by the line intersecting to X-axis and Y-axis.

(*ii*) A survey was conducted for 180 people in a city. 70 ate Pizza, 60 ate burgers and 50 ate chips. Draw a pie diagram for the given information.