# 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

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*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)

$5x + 3y = 9$

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

$7x = \square$

$x = \frac{\square}{\square}$

$x = \square$

(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.

(c) 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.