

N 913

Seat No.

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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

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(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 $t_n = \dots\dots\dots$

(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 :

(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. :

$$2, 4, 6, 8, \dots$$

(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 :

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

$$5x + 3y = 9 \dots\dots\dots (I)$$

$$2x - 3y = 12 \dots\dots\dots (II)$$

Add equations (I) and (II)

$$5x + 3y = 9$$

$$+ 2x - 3y = 12$$

$$7x = \boxed{21}$$

$$x = \frac{\boxed{}}{\boxed{}}$$

$$x = \boxed{}$$

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- (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 $ax^2 + bx + c = 0$

$$a = 1, b = 2, c = \boxed{}$$

$$\therefore b^2 - 4ac = (2)^2 - 4 \times \boxed{} \times \boxed{}$$

$$\Delta = 4 + \boxed{} = 40$$

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

\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 | <input type="text"/> |
| 2. | <input type="text"/> | Premium ₹ 500 | ₹ 575 |
| 3. | ₹ 10 | <input type="text"/> | ₹ 5 |
| 4. | ₹ 200 | Discount ₹ 50 | <input type="text"/> |

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

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(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.

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(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 \times Deviation $f_i d_i$ |
|--------------|------------------------|--------------------------------------|--------------------|--|
| 200-240 | 220 | -80 | 5 | -400 |
| 240-280 | 260 | -40 | 10 | -400 |
| 280-320 | 300 \rightarrow 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 = $\{\square, \square\}$

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

(c) Committee of one boy and one girl

= $\{\square, \square, \square, \square\}$

(d) \therefore Sample space (S) =

$\{(B_1 B_2), (B_1 G_1), \square, \square, (B_2 G_2), (G_1 G_2)\}$

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(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% | <input type="text"/> |
| 9963 | Masala Tea | 1 | 10 | 10.00 | <input type="text"/> | ₹ 0.25 | 2.5% | <input type="text"/> |
| 9963 | Masala Dosa | 2 | 60 | <input type="text"/> | 2.5% | <input type="text"/> | 2.5% | ₹ 3.00 |
| | | | Total | 150.00 | | <input type="text"/> | | ₹ 3.75 |
| Grand Total | | | | | | | = ₹ 157.50 | |

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

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(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 :

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

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- (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) :

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- (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 $(q + r - 2p) \times \frac{(p+r)}{2(q-p)}$.

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(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) :

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(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.

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