

N 362

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2020 III 12 1100 -N 362- MATHEMATICS (71) ALGEBRA—PART I (E)

Time : 2 Hours

(Pages 10)

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 MCQ's Q. No. 1(A) only the first attempt will be evaluated and will be given credit.
 - (v) For every MCQ, the correct alternative (A), (B), (C) or (D) of answers with subquestion number is to be written as an answer.

1. (A) For every subquestion 4 alternative answers are given. Choose the correct answer and write the alphabet of it : 4

(i) In the format of GSTIN there are alpha-numerals.

(A) 15

(B) 10

(C) 16

(D) 9

P.T.O.

2/N 362

(ii) From the following equations, which one is the quadratic equation ?

(A) $\frac{5}{x} - 3 = x^2$

(B) $x(x + 5) = 4$

(C) $n - 1 = 2n$

(D) $\frac{1}{x^2}(x + 2) = x$

(iii) For simultaneous equations in variables x and y , if $D_x = 49$, $D_y = -63$, $D = 7$, then what is the value of x ?

(A) 7_8

(B) -7

(C) $\frac{1}{7}$

(D) $\frac{-1}{7}$

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

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

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

(C) 10

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

3/N 362

(B) Solve the following subquestions :

4

- (i) Find second and third term of an A.P. whose first term is -2 and common difference is -2 .
- (ii) 'Pawan Medicals' supplies medicines. On some medicines the rate of GST is 12% , then what is the rate of CGST and SGST ?
- (iii) Find the values of a and b from the quadratic equation $2x^2 - 5x + 7 = 0$.
- (iv) If $15x + 17y = 21$ and $17x + 15y = 11$, then find the value of $x + y$.

2. (A) Complete and write any *two* activities from the following :

4

- (i) Complete the following table to draw the graph of $2x - 6y = 3$:

x	-5	<input type="text"/>
y	<input type="text"/>	0
(x, y)	<input type="text"/>	<input type="text"/>

P.T.O.

4/N 362

- (ii) First term and common difference of an A.P. are 6 and 3 respectively. Find S_{27} .

Solution :

First term = $a = 6$, common difference = $d = 3$, $S_{27} = ?$

$$S_n = \frac{n}{2} [\text{ } + (n-1)d] \text{ — formula}$$

$$S_{27} = \frac{27}{2} [12 + (27-1) \text{ }]$$

$$= \frac{27}{2} \times \text{ }$$

$$= 27 \times 45$$

$$\therefore S_{27} = \text{ }$$

- (iii) A card is drawn from a well shuffled pack of 52 playing cards. Find the probability of the event, the card drawn is a red card.

Solution :

Suppose 'S' is sample space.

$$\therefore n(S) = 52$$

Event A : Card drawn is a red card.

$$\therefore \text{Total red cards} = \text{ } \text{ hearts} + 13 \text{ diamonds.}$$

$$\therefore n(A) = \text{ }$$

$$\therefore p(A) = \frac{\text{ }}{n(S)} \text{ — formula}$$

$$\therefore p(A) = \frac{26}{52}$$

$$\therefore p(A) = \text{ }$$

5/N 362

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

8

(i) Find the value of the determinant :

$$\begin{vmatrix} 7 & 5 \\ 3 & 3 \\ 3 & 1 \\ 2 & 2 \end{vmatrix}$$

(ii) Solve the quadratic equation by factorisation method :

$$x^2 - 15x + 54 = 0.$$

(iii) Decide whether the following sequence is an A.P.; if so, find the 20th term of the progression :

$$-12, -5, 2, 9, 16, 23, 30, \dots$$

(iv) A two digit number is formed with digits 2, 3, 5, 7, 9 without repetition. What is the probability that the number formed is an odd number ?

(v) If $L = 10$, $f_1 = 70$, $f_0 = 58$, $f_2 = 42$, $h = 2$, then find the mode by using formula.

P.T.O.

6/N 362

3. (A) Complete and write any *one* activity from the following : 3

(i)

Age group (in years)	No. of Persons	Measure of central angle
20—25	80	$\frac{\boxed{}}{200} \times 360 = \boxed{}$
25—30	60	$\frac{60}{200} \times 360 = \boxed{}$
30—35	35	$\frac{35}{200} \times \boxed{} = 63^\circ$
35—40	25	$\frac{25}{200} \times 360 = \boxed{}$
Total	200	$\boxed{}$

(ii) Shri Shantilal has purchased 150 shares of FV ₹ 100, for MV of ₹ 120. Company has paid dividend at 7%, then to find the rate of return on his investment, complete the following activity : <http://www.maharashtrastudy.com>

Solution : FV = ₹ 100; Number of shares = 150

Market value = ₹ 120

(1) \therefore Sum investment = MV \times No. of Shares

$$= \boxed{} \times \boxed{}$$

\therefore Sum investment = ₹ 18,000

7/N 362

(2) Dividend per share = FV × Rate of dividend

$$= \boxed{} \times \frac{\boxed{}}{100}$$

$$= ₹ 7$$

∴ Total dividend received = 150 × 7

$$= \boxed{}$$

(3) Rate of return = $\frac{\text{Dividend income}}{\text{Sum invested}} \times 100$

$$= \frac{1050}{18000} \times 100$$

$$= \boxed{}$$

(B) Attempt any two subquestions from the following : 6

(i) A balloon vendor has 2 red, 3 blue and 4 green balloons. He wants to choose one of them at random to give it to Pranali.

What is the probability of the event that Pranali gets :

(1) a red balloon

(2) a blue balloon.

8/N 362

- (ii) The denominator of a fraction is 4 more than twice its numerator. Denominator becomes 12 times the numerator, if both the numerator and the denominator are reduced by 6, find the fraction.
- (iii) A milk centre sold milk to 50 customers. The table below gives the number of customers and the milk they purchased. Find the mean of the milk sold by direct method :

Milk Sold (litre) x_i	No. of Customers
1—2 1.5	17
2—3 2.5	13
3—4 3.5	10
4—5 4.5	7
5—6 5.5	3

- (iv) In an A.P. sum of three consecutive terms is 27 and their products is 504. Find the terms. <http://www.maharashtrastudy.com>

(Assume that three consecutive terms in an A.P. are $a - d$, a , $a + d$.)

9/N 362

4. Attempt any *two* subquestions from the following :

8

(i) Represent the following data by histogram :

Price of Sugar (per kg in ₹)	Number of Weeks
18—20	4
20—22	8
22—24	22
24—26	12
26—28	6
28—30	8

(ii) One person borrows ₹ 4,000 and agrees to repay with a total interest of ₹ 500 in 10 instalments. Each instalment being less than the preceding instalment by ₹ 10. What should be the first and the last instalments ?

(iii) The sum of the areas of two squares is 400 sq.m. If the difference between their perimeters is 16 m, find the sides of two squares.

P.T.O.

10/N 362

5. Attempt any one subquestion from the following :

3

- (i) Convert the following equations into simultaneous equations and solve :

$$\sqrt{\frac{x}{y}} = 4, \quad \frac{1}{x} + \frac{1}{y} = \frac{1}{xy}$$

- (ii) A dealer sells a toy for ₹ 24 and gains as much percent as the cost price of the toy. Find the cost price of the toy.