

N 172

Seat No.

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2021 IX 28 1030 -N 172- 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, 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 four alternative answers are given.

Choose the *correct* answer and write the alphabet of it : 4

(i) Which number cannot represent a probability ?

(A) $\frac{2}{3}$

(B) 1.5

(C) 15%

(D) 0.7

(ii) Find the value of common difference for an A.P. $-10, -6, -2, 2, \dots$

(A) -16

(B) -4

(C) 4

(D) 16

(iii) Which of the following quadratic equations has roots 3, 5 ?

(A) $x^2 - 15x + 8 = 0$

(B) $x^2 - 8x + 15 = 0$

(C) $x^2 + 3x + 5 = 0$

(D) $x^2 + 8x - 15 = 0$

(iv) Find the value of $\begin{vmatrix} 2 & 3 \\ 4 & 5 \end{vmatrix}$:

(A) -22

(B) 2

(C) 22

(D) -2

(B) Solve the following subquestions :

4

- (i) Decide whether the equation $m^3 - 5m^2 + 4 = 0$ is a quadratic equation or not ? Justify.
- (ii) For a given A.P. $a = 3.5$, $d = 0$, then find t_n .
- (iii) If $x + 2y = 5$ and $2x + y = 4$, then find the value of $x + y$.
- (iv) If two coins are tossed simultaneously, write the sample space.

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

4

- (i) First term and common difference of an A.P. are 6 and 3 respectively. Complete the following activity to find S_{27} .

Activity :

$$a = 6, d = 3, S_{27} = ?$$

$$S_n = \frac{n}{2} \left[\boxed{} + (n - 1) \times d \right]$$

$$\therefore S_{27} = \frac{27}{2} \left[12 + (27 - 1) \times \boxed{} \right]$$

$$\therefore S_{27} = \frac{27}{2} \times \boxed{}$$

$$\therefore S_{27} = 27 \times 45$$

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

- (ii) To draw the graph of $4x + 5y = 19$, complete the following activity to find y , when $x = 1$.

Activity :

$$4x + 5y = 19$$

$$\therefore 4 \times \boxed{} + 5y = 19$$

$$\therefore 5y = 19 - \boxed{}$$

$$\therefore y = \frac{\boxed{}}{5}$$

$$\therefore y = \boxed{}$$

- (iii) A die is rolled. Complete the following activity to find the probability of getting a prime number on the upper face of die.

Activity :

'S' is the sample space for a die rolled

$$\therefore S = \{\boxed{}\}, \quad \therefore n(S) = 6$$

Event A : To get prime number on the upper face

$$\therefore A = \{\boxed{}\}, \quad \therefore n(A) = 3$$

$$\therefore P(A) = \frac{\boxed{}}{n(S)} \dots\dots\dots \text{(formula)}$$

$$\therefore P(A) = \frac{3}{6}$$

$$\therefore P(A) = \frac{1}{\boxed{}}$$

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

(i) Determine nature of the roots of the quadratic equation

$$2x^2 - 5x + 7 = 0 \text{ by using discriminant.}$$

(ii) Solve the following simultaneous equations :

$$5x + 4y = 17, 4x + 5y = 10.$$

(iii) A box contains 5 strawberry chocolates, 6 coffee chocolates and 2 peppermint chocolates. Find the probability that the chocolate picked at random from the box is a coffee chocolate.

(iv) For simultaneous equations in variables x and y , if $D_x = 49$,

$$D_y = -63 \text{ and } D = 7, \text{ then find the value of } x \text{ and } y.$$

(v) Find the 24th term of the following A.P. :

$$12, 16, 20, 24, \dots\dots\dots$$

6/N 172

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

(i) A two digit number is to be formed from the digits 2, 3, 5 without repetition of the digits. Complete the following activity to find the probability that the number so formed is an odd number.

Activity :

Let 'S' be the sample space

$$\therefore S = \{23, 25, 32, \boxed{}, 52, 53\}$$

$$\therefore n(S) = \boxed{}$$

Now condition for event 'A' is that number so formed is an odd number.

$$\therefore A = \{23, 25, \boxed{}, 53\}, \therefore n(A) = 4$$

$$\therefore P(A) = \frac{\boxed{}}{n(S)} \dots\dots\dots \text{(formula)}$$

$$\therefore P(A) = \frac{\boxed{}}{6}$$

$$\therefore P(A) = \frac{\boxed{}}{3}$$

7/N 172

- (ii) If $x = 5$ is a root of quadratic equation $kx^2 - 14x - 5 = 0$, then find the value of k by completing the following activity.

Activity :

One of the roots of quadratic equation $kx^2 - 14x - 5 = 0$ is 5.

\therefore Substituting $x = \boxed{}$ in the above equation.

$$\therefore k \boxed{}^2 - 14 \times 5 - 5 = 0$$

$$\therefore \boxed{}k - 70 - 5 = 0$$

$$\therefore 25k = \boxed{}$$

$$\therefore k = \frac{75}{\boxed{}}$$

$$\therefore k = \boxed{}$$

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

- (i) In an A.P. sum of three consecutive terms is 27 and their product is 504. Find the terms.

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

8/N 172

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

$$4m + 6n = 54, 3m + 2n = 28.$$

- (iii) A die is rolled and a coin is tossed simultaneously. Write the sample space 'S' and number of sample points $n(S)$. Also write the events A and B in set form and their number of sample points according to the given condition :

- (a) Condition for event A : To get a head or tail on the coin and a number divisible by 3 on the upper face of die.
- (b) Condition for event B : To get a number on the upper face of die greater than 7 and a head on the coin.

- (iv) Solve the following simultaneous equations graphically :

$$x + y = 7, x - y = -1.$$

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

8

- (i) Out of the total students of class 10th, $\frac{7}{2}$ times the square root of total number of students are playing on the ground and remaining 2 students are studying in the classroom. Find the total number of students in class 10th.

9/N 172

(ii) When one is added to the numerator as well as the denominator of a certain fraction, it becomes $\frac{1}{2}$ and if one is subtracted from the numerator and denominator both, the fraction becomes $\frac{1}{3}$. Find the original fraction.

(iii) In an A.P. 16, 14, 12, the sum of how many terms is 60 ? Write these terms with all possibilities.

5. Attempt any *one* subquestion from the following : 3

(i) For a quadratic equation in variable ' m ', the coefficients a , b and c are such that $a = 2$, $b = 4a$, $c = 3a$.

Form the quadratic equation and solve it by factorisation method.

(ii) Write any one arithmetic progression with common difference 5. Find its n th term and sum of first ' n ' terms.