

MT

2018 ____ ____ 1100

Seat No.

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MT - MATHEMATICS (71) Algebra - SEMI PRELIM - II - PAPER - V

Time : 2 Hours

(Pages 5)

Max. Marks : 40

Q.1. (A) Solve the following : (Any 4)

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1. Write the set in Roster form : Set of prime numbers from 1 to 20.
2. Check whether the given rational number has terminating or recurring type of decimal form : $\frac{4}{5}$
3. If the value of the polynomial $m^3 + 2m + a$ is 12 for $m = 2$, then find the value of a.
4. Write five solutions of the equation $x + y = 7$.
5. Solve : $|7| \times |-4|$
6. Write any three rational numbers between the two numbers given below.
-2.3 and -2.33

Q.1. (B) Solve the following : (Any 2)

4

1. Solve the following simultaneous equations.
 $2x - 7y = 7$; $3x + y = 22$
2. Simplify: $\sqrt{54} \div \sqrt{27}$
3. If $n(A) = 15$, $n(A \cup B) = 29$, $n(A \cap B) = 7$, then find $n(B)$.

Q.2. (A) Solve the following :

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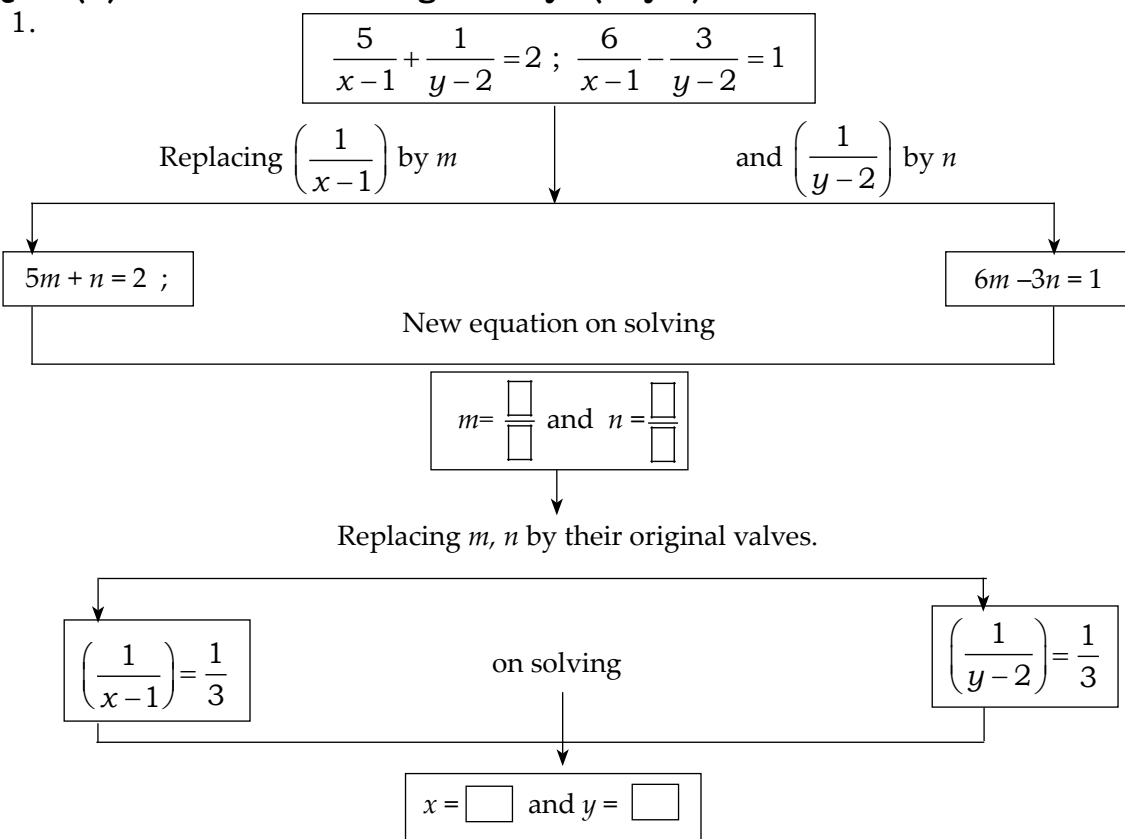
1. Which of the following quadratic equations has roots 3, 5 ?
(A) $x^2 - 15x + 8 = 0$ (B) $x^2 - 8x + 15 = 0$
(C) $x^2 + 3x + 5 = 0$ (D) $x^2 + 8x - 15 = 0$
2. A die is rolled. What is the probability that the number appearing on upperface is less than 3?
(A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) 0

3. Find the value of $\begin{vmatrix} 5 & 3 \\ -7 & -4 \end{vmatrix}$
 (A) -1 (B) -41 (C) 41 (D) 1
4. Out of the following equations, find the equation having the sum of its roots -5.
 (A) $3x^2 - 15x + 3 = 0$ (B) $x^2 - 5x + 3 = 0$
 (C) $x^2 + 3x - 5 = 0$ (D) $3x^2 + 15x + 3 = 0$

Q.2. (B) Solve the following : (Any 2) 4

1. A box contains 5 red, 8 blue and 3 green pens. Rutuja wants to pick a pen at random. What is the probability that the pen is blue?
2. Find the value of D_x and D_y for the following equations.
 $7x + 3y = 15$; $12y - 5x = 39$
3. Determine the nature of roots from the following quadratic equations.
 $x^2 - 4x + 4 = 0$

Q.3. (A) Solve the following activity : (Any 2) 4



∴ $(x, y) = (4, 5)$ is the solution of the given simultaneous equations.

2. $5x^2 + 13x + 8 = 0$

Solution:

$$5x^2 + 13x + 8 = 0$$

Comparing with $ax^2 + bx + c = 0$, we get,

$$a = 5, b = 13, c = 8$$

$$\therefore b^2 - 4ac = (13)^2 - 4 \times 5 \times 8$$

$$= \square - \square$$

$$= \square$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \dots(\text{Formula})$$

$$= \frac{-13 \pm \sqrt{\square}}{2 \times 5}$$

$$= \frac{-13 \pm \sqrt{\square}}{10}$$

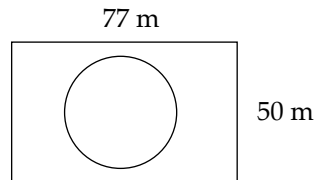
$$\therefore x = \frac{-13 + \sqrt{\square}}{10} \quad \text{or } x = \frac{-13 - \sqrt{\square}}{10}$$

$$\therefore x = \frac{-10}{10} \quad \text{or } x = \frac{-16}{10}$$

$$\therefore x = \square \quad \text{or } x = \frac{\square}{\square}$$

\therefore The roots of given quadratic equation are -1 and $\frac{-8}{5}$.

3. Length and breadth of a rectangular garden are 77 m and 50 m. There is a circular lake in the garden having diameter 14 m. Due to wind, a towel from a terrace on a nearby building fell into the garden. Then find the probability of the event that it fell in the lake.



Solution:

S : Area of the garden.

Length of the garden = 77 m,

Breadth of the garden = 50 m

$$\therefore \text{Area of the garden} = \square = \square \text{ sq m.}$$

Let A be the event that the towel fell in a lake.

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$$\begin{aligned}
 \text{Diameter of the lake} &= \boxed{} \text{ m} \\
 \therefore \text{Radius of the lake} &= \boxed{} \text{ m} \\
 \therefore \text{Area of the lake} &= \pi r^2 \\
 &= \boxed{} \times \boxed{} \times \boxed{} \\
 &= \boxed{} \text{ sq m.}
 \end{aligned}$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

$$\therefore P(\text{Towel fell in the lake}) = \boxed{}$$

Q.3. (B) Solve the following activity : (Any 2)

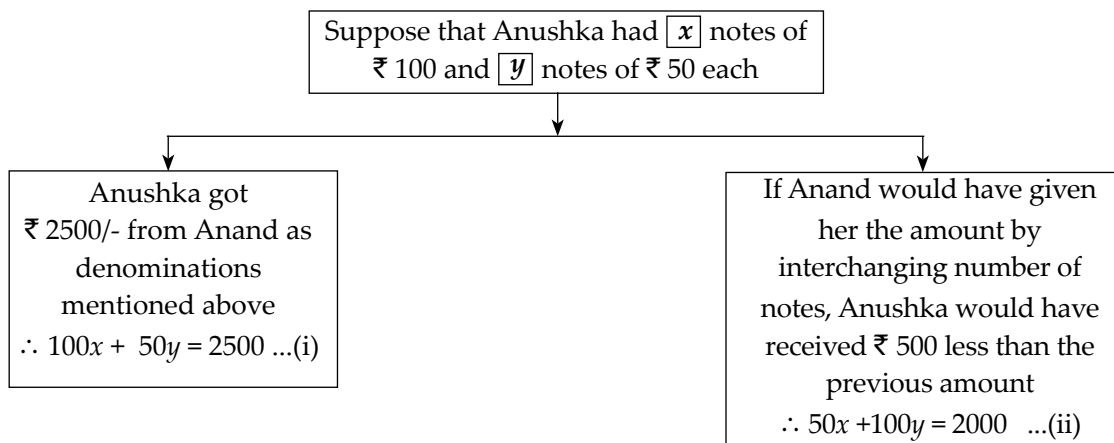
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1. Solve using Elimination by substitution method.
 $3a + 5b = 26$; $a + 5b = 22$
2. Form the quadratic equation from the roots given below :
 $1 - 3\sqrt{5}$ and $1 + 3\sqrt{5}$
3. In a hockey team there are 6 defenders, 4 offenders and 1 goalee. Out of these, one player is to be selected randomly as a captain. Find the probability of the selection that -
 - (i) The goalee will be selected.
 - (ii) A defender will be selected.

Q.4. Solve the following : (Any 3)

9

1. To find number of notes that Anushka had, complete the following activity.



2. Solve the following quadratic equation by completing the square method.

$$5x^2 = 4x + 7$$

3. Write sample space 'S' and number of sample points $n(S)$ for the following experiment. Also write events A,B,C in the set form and write $n(A), n(B), n(C)$.

One coin and one die are thrown simultaneously.

Condition for event A : To get head and an odd number.

Condition for event B : To get a head or tail and an even number.

Condition for event C : Number on the upper face is greater than 7 and tail on the coin.

4. Solve the following simultaneous equations.

$$\frac{7}{2x+1} + \frac{13}{y+2} = 27 ; \frac{13}{2x+1} + \frac{7}{y+2} = 33$$

Q.5 Solve the following : (Any 1)

4

1. Solve the following simultaneous equations graphically.

$$x + y = 5 ; x - y = 3$$

2. A tank fills completely in 2 hours if both the taps are open. If only one of the taps is open at the given time, the smaller tap takes 3 hours more than the larger one to fill the tank. How much time does each tap take to fill the tank completely.

Q.6 Solve the following : (Any 1)

3

1. Sum of the roots of a quadratic equation is double their product. Find k if equation is

$$x^2 - 4kx + k + 3 = 0.$$

2. If two dice are rolled simultaneously, find the probability of the following events.

(i) The sum of the digits on the upper faces is at least 10.

(ii) The sum of the digits on the upper faces is 33.

(iii) The digit on the first die is greater than the digit on second die.

Best of Luck 