



**SECTION A**

Followings multiple choice questions are of **1 Mark** each (Q01-10).

Select the correct option in each one of them.

Q01. Which one of the following is a quadratic equation?

(A)  $x^2 + 2x + 1 = (4 - x)^2 + 3$

(B)  $-2x^2 = (5 - x)\left(2x - \frac{5}{2}\right)$

(C)  $(k+1)x^2 + \frac{3}{2}x = 7; k = -1$

(D)  $2x - x^2 = (x - 1)^2$

Q02. The non-zero value of k, for which the quadratic equation  $2x^2 - kx - k = 0$  has equal roots, is/are

(A) 0

(B) 4

(C) 8

(D) -8

Q03. The equation  $2x^2 - \sqrt{5}x + 1 = 0$  has

(A) two distinct real roots

(B) two equal real roots

(C) no real roots

(D) more than two real roots

Q04. If  $x = 1$  is a common root of  $ax^2 + ax + 2 = 0$  and  $x^2 + x + b = 0$ , then  $a : b$  is equal to

(A) 1 : 2

(B) 2 : 1

(C) 1 : 4

(D) 4 : 1

Q05. If the sum of the roots of the quadratic equation  $mx^2 + 6x + 4m = 0$  is equal to the product of the roots, then  $m =$

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

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

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

(D)  $-\frac{2}{3}$

Q06. If the sum of the roots of the equation  $x^2 - x = p(2x - 1)$  is zero (0), then  $p =$

(A) -2

(B) 2

(C)  $\frac{1}{2}$

(D)  $-\frac{1}{2}$

Q07. Which one of the following equations has two distinct real roots?

(A)  $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$

(B)  $x^2 + x - 5 = 0$

(C)  $x^2 + 2x + 2\sqrt{2} = 0$

(D)  $5x^2 - 3x + 1 = 0$

Q08. If one root of  $4x^2 - 2x + k - 4 = 0$  be the reciprocal of the other, then

(A)  $k = -8$

(B)  $k = 8$

(C)  $k = 4$

(D)  $k = -4$

Followings are **Assertion-Reason based questions** (Q09 & 10).

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true and R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Q09. **Assertion (A) :** The quadratic equation  $ax^2 + bx + c = 0; a \neq 0$  will have real roots if  $b^2 - 4ac \geq 0$ .

**Reason (R) :** The expression  $\sqrt{b^2 - 4ac}$  is known as the discriminant of the quadratic equation.

Q10. **Assertion (A) :** If  $2 - \sqrt{3}$  is one root of the quadratic equation, then the other root will be  $2 + \sqrt{3}$ .

**Reason (R) :** Irrational roots always occur in pairs and they are conjugate of each other.

[1 × 10 = 10]

**SECTION B**

Followings are of **2 Marks** each (Q11-12).

Q11. (a) Solve for  $x : 4x^2 - 2(a^2 + b^2)x + a^2b^2 = 0$ .

**OR**

(b) Sum of two natural numbers is 15 and sum of their reciprocals is  $\frac{3}{10}$ . Find the numbers.

Q12. Find the discriminant of the quadratic equation  $4x^2 - 5 = 0$ , and hence comment on the nature of roots of the equation.

[2×2 = 4]

### SECTION C

Followings are of **3 Marks** each (Q13-16).

Q13. (a) Solve for x :  $3\left(\frac{3x-1}{2x+3}\right) - 2\left(\frac{2x+3}{3x-1}\right) = 5$ ;  $x \neq \frac{1}{3}, -\frac{3}{2}$ .

OR

(b) Solve for x :  $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$ ;  $x \neq 0, x \neq -\frac{2a+b}{2}, a \neq 0, b \neq 0$ .

Q14. A motor boat whose speed is 18 km/hr in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream.

Q15. A drone is hovering at the top of a vertical tower that is 20 meters high. A car is moving in a straight line toward the base of the tower. At a certain moment, the car is 80 meters away from the base. At the same moment, the drone begins to descend in a straight line to intercept the car. Assuming the drone and the car are moving at the same constant speed, at what distance from the base of the tower will the drone intercept the car?

Q16. Find the value of p, for which one root of the quadratic equation  $px^2 - 14x + 8 = 0$  is 6 times the other.

[3×4 = 12]

### SECTION D

Followings are of **5 Marks** each (Q17-18).

Q17. At present, Kavita's age in years is 2 more than the square of her daughter, Nisha's age. When Nisha grows to her mother's present age, Kavita's age would be 1 year less than 10 times the present age of Nisha. Find the present ages of both Nisha and Kavita.

Q18. (a) If the equation  $(1+t^2)x^2 + (2tc)x + (c^2 - a^2) = 0$  has equal roots, prove that  $c^2 = a^2(1+t^2)$ .

OR

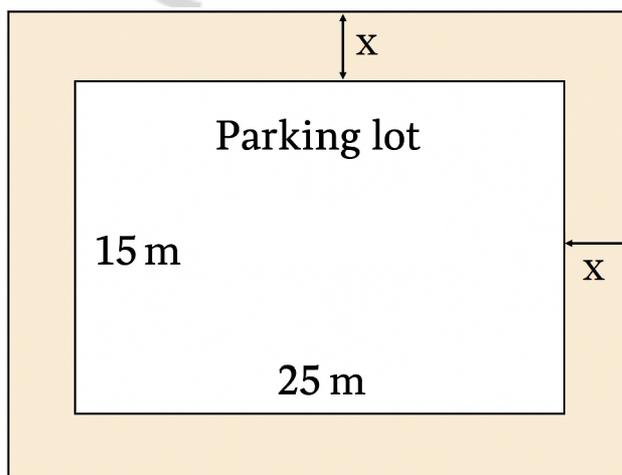
(b) A garden designer is creating a mosaic pattern using two different square tiles made of colored glass. The total area available for tiling is  $400 \text{ cm}^2$ , and the tiles are square in shape but of different sizes. To give a visually appealing border effect, the designer wants the difference in the perimeters of the two square tiles to be exactly 16 cm. She wants to know the dimensions of each square tile so that this condition is satisfied while completely utilizing the  $400 \text{ cm}^2$  of glass available. Frame a quadratic equation to find the required dimensions and hence determine the dimensions also.

[5×2 = 10]

### SECTION E

Following is a case-study based question of **4 Marks** (Q19); having three sub-parts (i), (ii) and (iii).

Q19. A school plans to construct a rectangular parking lot measuring 25 meters in length and 15 meters in width. Around the parking lot, a path of uniform width x meters is to be constructed on all four sides, such that the total area (parking lot + path) becomes 551 square meters.



On the basis of the above information, answer the following questions.

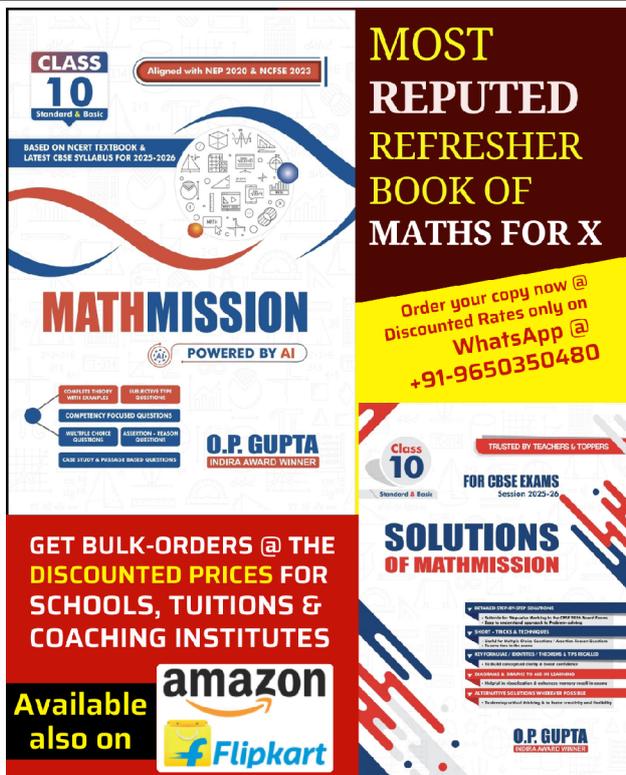
- (i) Write an expression for the total area (including the path) in terms of  $x$ , the width of the path.
- (ii) Form a quadratic equation in  $x$ , based on the total area 551 square meters.
- (iii) (a) Solve the quadratic equation obtained in sub-part (ii) to find the width of the path.

OR

- (b) If the width of the path were increased by 1 meter, what would the new total area be?

$$[1+1+2 = 4]$$

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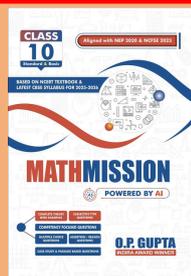
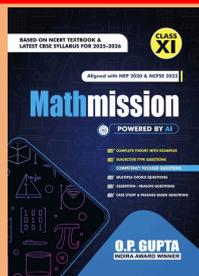
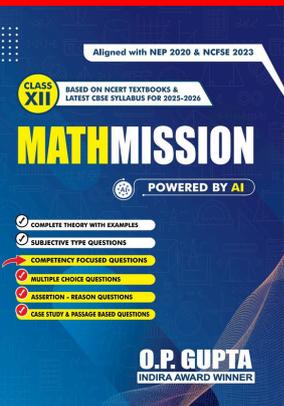
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