EXERCISE

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

EASY LEVEL

1. The equation $ax^2 + bx + c = 0$ is a quadratic equation for:

a) all values of a b) all non-zero values of a c) all non-zero values of b d) none of these

2. If the sum and product of zeroes of the quadratic equation $kx^2 + 6x + 4k = 0$ are equal, then the value of k is:

a) $\dfrac{3}{2}$ b) $-\dfrac{3}{2}$ c) $-\dfrac{2}{3}$ d) $\dfrac{2}{3}$

3. If $(a-1)x^2 + 3x = 5$ is a quadratic equation, then:

a) a can take any real value   b) a can take any non-zero value

c) $a \neq 1$ d) $a = 1$

4. Which of the following is a quadratic equation?:

a) $x^2 + 2x + 1 = (4-x)^2 + 3$ b) $-2x^2 = (5-x)\left(2x - \dfrac{2}{5}\right)$

c) $(k+1)x^2 + \dfrac{3}{2}x = 7, \ k = -1$ d) $x^3 - x^2 = (x-1)^3$

5. Which of the following equation has the sum of its roots as 3:

a) $2x^2 - 3x + 6 = 0$ b) $-x^2 + 3x - 3 = 0$ c) $\sqrt{2}x^2 - \dfrac{3}{\sqrt{2}}x + 1 = 0$ d) none of these

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

EASY LEVEL

Each of the following examples contains STATEMENT -1 (ASSERTION) and STATEMENT-2 (REASON) has following four choices (a), (b), (c), and (d), only one of which is the correct answer.

a) Statement -1 is true, Statement- 2 is true; Statement-2 is a correct explanation for Statement-1.

b) Statement -1 is true, Statement- 2 is true; Statement-2 is not a correct explanation for Statement-1.

c) Statement -1 is true, Statement- 2 is false.

d) Statement -1 is false, Statement- 2 is true.

1. Statement-1(Assertion): A quadratic equation having $\dfrac{1}{2} \ and \ \dfrac{1}{3}$ as its zeroes is $6x^2 - 5x + 1 = 0$.

Statement- 2 (Reason): The roots of the quadratic equation $ax^2 + bx + c = 0$ are given by

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

III. CASE BASED QUESTIONS

EASY LEVEL

1. Nitin has a field with total area of 1260m^2. He uses it to grow wheat and rice. The land used to grow wheat i.e. Wheatland is rectangular in shape while the Riceland is in the shape of a square. The length of wheat lands is 3 m more than twice the length of Riceland.

Based on the above information answer the following questions:

a) If the length of the Riceland is x m, what is the total length of the field.

b) Find the perimeter of the field.

c) What is the value of *x*?

OR

Find the area of the Wheatland.

IV. SHORT ANSWER TYPE QUESTIONS (SA I) [2 MARKS EACH]

EASY LEVEL

1 Check whether the following are quadratic equations or not :

i. $3x^2 + 2x - 5 = 0$ **ii.** $3x^2 - 5 = 0$ **iii.** $3x^2 + 2x = 0$

iv. $x^2 = 0$ **v.** $x + \dfrac{2}{x} = x^2$ **vi.** $x^2 + \dfrac{2}{x^2} = 2$

2. Form quadratic equation if roots are :

i. 2, –3   **ii.** – 7 , 18   **iii.** $2 + \sqrt{3}, 2 - \sqrt{3}$

3. Solve the following quadratic equations by using factorisation method :

i. $x^2 - 9 = 0$ **ii.** $4x^2 + 5x = 0$ **iii.** $48x^2 - 13x - 1 = 0$

4. Find the value of k for which the given equation has equal roots:

5. Form an equation for two consecutive positive odd numbers, the sum of whose squares is 802.

6. The sum of the squares of three consecutive natural numbers is 149. Form a quadratic equation for the condition.

V. SHORT ANSWER TYPE QUESTIONS (SA II) [3 MARKS EACH]

EASY LEVEL

1. Solve the following quadratic equations by using quadratic method or D method or discriminant method :

i. $2x^2 - 7x + 3 = 0$ **ii.** $3x^2 + 11x + 10 = 0$ **iii.** $4x^2 + 4\sqrt{3}x + 3 = 0$

iv. $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$ **v.** $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ **vi.** $\sqrt{2}x^2 - 3x - 2\sqrt{2} = 0$

2. Find the roots of the following:

a) $8x^2 - 22x - 21 = 0$ b) $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ c) $\dfrac{1}{x-1} - \dfrac{1}{x+5} = \dfrac{6}{7}$, $x \neq 1, -5$

3. Find the value of k for which the given equation has equal roots:

i. $(k-12)x^2 + 2(k-12)x + 12 = 0$ **ii.** $(k+4)x^2 + (k+1)x + 1 = 0$

4. The sum of two numbers is 15. If the sum of their reciprocals is $\dfrac{3}{10}$, find the numbers.

5. The sum of the squares of two consecutive even integers is 244. What are these numbers?

6. The difference of the squares of two consecutive even integers is 60. What are these numbers?

7. The sum of the squares of two consecutive even integers is 452. What are these numbers?

8. A train travels a distance of 300 km at constant speed. If the speed of the train is increased by 5 km an hour, the journey would have taken 2 hours less. Find the original speed of the train.

9. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

MEDIUM LEVEL

1. If α, β are two roots of the quadratic equation $ax^2 + bx + c = 0$, then $ax^2 + bx + c$ is equal to :

a) $a(x+\alpha)(x+\beta)$ b) $a(x-\alpha)(x-\beta)$ c) $b(x+\alpha)(x+\beta)$ d) $b(x-\alpha)(x-\beta)$

2. Which of the following equations has 2 as a root?

a) $x^2 - 4x + 5 = 0$ b) $x^2 + 3x - 12 = 0$ c) $2x^2 - 7x + 6 = 0$ d) $3x^2 - 6x - 2 = 0$

3. If one root of the equation $3x^2 = 8x + (2k+1)$ is seven times the other, then the value of k is:

a) $\dfrac{7}{3}$ b) $\dfrac{5}{3}$ c) $\dfrac{-5}{3}$ d) $\dfrac{-7}{3}$

4. If one root of the equation $ax^2 + bx + c = 0$ is three times the other, then:

a) $b^2 = 16ac$ b) $b^2 = 3ac$ c) $3b^2 = 16ac$ d) $16b^2 = 3ac$

5. If $x = 0.2$ is a root of the equation $x^2 - 0.4k = 0$, then k is :

a) 1   b) −1   c) 0.1   d) 10

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

MEDIUM LEVEL

Each of the following examples contains STATEMENT -1 (ASSERTION) and STATEMENT-2 (REASON) has following four choices (a), (b), (c), and (d), only one of which is the correct answer.

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c) Statement -1 is true, Statement- 2 is false.

d) Statement -1 is false, Statement- 2 is true.

1. Statement-1(Assertion): If $2 + \sqrt{3}$ is a root of a quadratic equation with rational coefficients then its other

    root is $2 - \sqrt{3}$.

    Statement- 2(Reason): Roots of a quadratic equation with rational coefficients occur in conjugate pairs.

III. CASE BASED QUESTIONS

MEDIUM LEVEL

1. Siddhant and Rishav are very close friends. They decided to go to Manas National Park with their parents in separate cars. Siddhant's car travels at speed of x km/hr while Rishav's car travels 5 km/hr faster than Siddhant's car. Siddhant took 4 hours more than Rishav to complete the journey of 400km**.**

Based on the above information answer the following questions:

a) Find the distance covered by Rishav's car in 2 hrs.

b) Find the distance covered by Siddhant's car in 5 hrs.

c) Find the speed of Siddhant's car.

OR

Find the speed of Rishav's car.

MEDIUM LEVEL

1. **Solve by factorisation:**

   i. $ax^2 + (4a^2 - 3b)x - 12ab = 0$

   ii. $abx^2 - (a^2 + b^2)x + ab = 0$

   iii. $a^2b^2x^2 + b^2x - a^2x - 1 = 0$

   iv. $a(x^2 + 1) - x(a^2 + 1) = 0$

2. Find the value of k for which the given equation has real roots:

   a) $kx^2 - 6x - 2 = 0$

   b) $9x^2 + 3kx + 4 = 0$

3. Find k such that the sum of the roots of the equation $3x^2 + (1 + 2k)x - k + 5 = 0$ is equal to the product of roots.

4. Find three consecutive even integers such that the product of the first two is 38 more than the third integer.

5. Find three consecutive odd integers such that the product of the first two is 52 more than the third integer.

V. SHORT ANSWER TYPE QUESTIONS (SA II) [3 MARKS EACH]

MEDIUM LEVEL

1. Find the roots of the following:

   i. $9x^2 - 6b^2x - (a^4 - b^4) = 0$

   ii. $\dfrac{x-3}{x+3} - \dfrac{x+3}{x-3} = \dfrac{48}{7}; \ x \neq 3, -3.$

   iii. $x + \dfrac{1}{x} = 25\dfrac{1}{25}$

2. If –5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

3. Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.

4. A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

5. Seven years ago Arun's age was five times the square of Swati's age. Three years hence Swati's age will be two fifth of Arun's age . find their present ages.

6. The hypotenuse of right triangle is 13cm the difference between the other two sides is 7cm. Find other two sides.

7. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore. If the average speed of the express train is 11km / hr more than that of the passenger train, form the quadratic equation to find the average speed of express train.

8. Two pipes running together can fill a cistern in $13\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill it, find the time in which each pipe would fill the cistern.

9. A person on tour has Rs. 360 for his daily expenses. If he exceeds his tour programme by 4 days, he must cut down his daily expenses by Rs.3 per day. Find the number of days of his tour programme.

10. Rs. 250 are divided equally among a certain number of children. If there are 25 children more, each would have received 50 paise less. Find the number of children.

VI. LONG ANSWER TYPE QUESTIONS (LA) [5 MARKS EACH]

MEDIUM LEVEL

1. Solve the following quadratic equations by using quadratic method or D method or discriminant method :

i. $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$

ii. $(a+b)^2 x^2 - 4abx - (a-b)^2 = 0$

2. A plane left 30 minutes later than the schedule time and in order to reach its destination 1500km away in time it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.

3. A rectangular plot of land of outer dimensions 30 m by 20 m, has a path of uniform width running along its boundary from inside. If the area, excluding the path, is 375 m ^{2}, find the width of the path.

4. The sides of a right-angled triangle cont-aining the right angle are 5x cm and (3x–1) cm. If the area of the triangle be 60 cm^2 , calculate the lengths of sides of the triangle and find perimeter.

5. The angry Arjun carried some arrows for fighting with Bheeshm. With half the arrows, he cut down the arrows thrown by Bheeshm on him and with six other arrows he killed the rath driver of Bheeshm. With one arrow each he knocked down respectively the rath, flag and the bow of Bheeshm. Finally, with one more than four times the square root of arrows he laid Bheeshm unconscious on an arrow bed. Find the total number of arrows Arjun had.

I. MULTIPLE TYPE QUESTIONS [MCQ'S 1 MARK EACH]

DIFFICULT LEVEL

1. The number of real roots of the equation $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$ is:

a) 2   b) 3   c) 1   d) none of these

2. If a quadratic equation has one root $1 + \sqrt{2}$, then the quadratic equation is:

a) $x^2 - 2x + 1 = 0$

b) $x^2 - 2x - 1 = 0$

c) $x^2 + 2x + 1 = 0$

d) $x^2 + 2x - 1 = 0$

3. If the roots of the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$, are equal then:

a) $b = \dfrac{2ac}{a+c}$

b) $b = \dfrac{ac}{a+c}$

c) $c = \dfrac{2ab}{a+b}$

d) $a = \dfrac{2bc}{b+c}$

4. If a, b are the roots of the equation $x^2 + ax + b = 0$, then the value of a and b are equal to:

a) −1, 2

b) 1, 2

c) 1, −2

d) −1, −2

5. The value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \cdots}}}$ is:

a) 4

b) 3

c) −2

d) 3.5

II. ASSERTION AND REASON TYPE QUESTIONS [1 MARK EACH]

DIFFICULT LEVEL

Each of the following examples contains STATEMENT -1 (ASSERTION) and STATEMENT-2 (REASON) has following four choices (a), (b), (c), and (d), only one of which is the correct answer.

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c) Statement -1 is true, Statement- 2 is false.

d) Statement -1 is false, Statement- 2 is true.

1. Statement-1(Assertion): If $a + b + c = 0$, then $ax^2 + bx + c = 0$ has 1 as its root.

Statement- 2(Reason): If one root of a quadratic equation is real, then the other root is also real.

III. CASE BASED QUESTIONS

1. India is one of the largest importers of crud oil. Oil companies produce crude oil in barrels. Suppose the maximum oil produced by company is 300 barrels and profit made from sale of these barrels is given by the function

$p(x) = -10x^2 + 3500x - 66000,$ where p(x) is profit in rupees and x is the number of barrels produced and sold.

Based on the above information answer the following questions:

a) If no barrel is produced, what is the profit or loss?

b) On producing 100 barrels, what is the profit earned by the company.

c) How many barrels should the company produce to achieve break even points?

OR

What is the maximum profit which can manufacturer earn?

IV. SHORT ANSWER TYPE QUESTIONS (SA I) [2 MARKS EACH]

1. Find the values of k for which the equation $x^2 + 5kx + 16 = 0$ has no real roots**.**

2. If p, q, r and s are real numbers such that pr = 2(q + s), then show that at least one of the equations $x^2 + px + q = 0$, $x^2 + rx + s = 0$ has real roots.

3. If the roots of the equation $x^2 + 2cx + ab = 0$ are real unequal, prove that the equation $x^2 - 2(a + b) x + a^2 + b^2 + 2c^2 = 0$ has no real roots.

V. SHORT ANSWER TYPE QUESTIONS (SA II) [3 MARKS EACH]

DIFFICULT LEVEL

1. Find the roots of the following:

   a) $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$ **b)** $\dfrac{1}{a+b+x} = \dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{x}, \ a+b \neq 0$ **c)** $3\left(\dfrac{7x+1}{5x-3}\right) - 4\left(\dfrac{5x-3}{7x+1}\right) = 11; \ x \neq \dfrac{3}{5}, \dfrac{-1}{7}$

2. If the roots of the equations $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal then prove that : $2b = a + c$.

3. If the roots of the equation : $\left(a^2 + b^2\right)x^2 - 2\left(ac + bd\right)x + \left(c^2 + d^2\right) = 0$ are equal, prove that $\dfrac{a}{b} = \dfrac{c}{d}$.

4. If -5 is root of quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation on $p(x^2 + x) + k = 0$ has equal roots, then find the value of p & k.

5. Prove that both the roots of the equation $(x-a)(x-b) + (x-b)(x-c)(x-a) = 0$, are real but they are equal only when $a = b = c$.

6. The side of a square exceeds the side of another square by 4 cm and sum of the areas of the two squares is 400 sq. cm. Find the dimensions of the square.

VI. LONG ANSWER TYPE QUESTIONS (LA) [5 MARKS EACH]

DIFFICULT LEVEL

1. One –fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total numbers of camels.

2. Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than the second train. If after two hours, they are 50 km apart, find the average speed of each train.

3. A peacock is sitting on a top of a pillar, which is 9 m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the whole is the snake caught?

4. At t minutes past 2 pm, the time needed by the minutes hand of a clock to show 3 pm was found to be 3 minutes less than $t^2/4$ minutes. Find t.

5. At present Asha'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, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

6. If Zeba were younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?

ANSWERS

EASY LEVEL

I. MCQ   **1.** b,   **2.** b,   **3.** c,   **4.** d,   **5.** b

II. Assertion Reason   **1.** b

III. Case Study   **a.** 3x + 3,   **b.** 8x + 6,   **c.** x = 20 m   **c.OR** 860 m²

IV. SA I   **1. i.** Y   **ii.** Y   **iii.** Y   **iv.** Y **v.** N **vi.** N   **2. i.** $x^2 + x - 6$ **ii.** $x^2 - 11x - 126$ **iii.** $x^2 - 4x + 1$

3. i. 3, –3   **ii.** 0, –5/4   **iii.** 1/3, –1/16   **4. i.** k = 16   **ii.** k = 8   **5.** $2x^2 + 2x - 801 = 0$ **6.** $x^2 + 2x - 48 = 0$

V. SA II   **1.i.** 3, 1/2   **ii.** –5/3, –2   **iii.** $-\sqrt{3}/2, -\sqrt{3}/2$ **iv.** $-\sqrt{3}, -7/\sqrt{3}$ **v.** $\sqrt{3}/4, -2/\sqrt{3}$ **vi.** $2\sqrt{2}, -1/\sqrt{2}$

2. i. x = 7/2 or –3/4   **ii.** $\sqrt{6}, -\sqrt{6}/3$ **iii.** 2, –6   **3. i.** k = 12 or k = 24 **ii.** k = – 3 or k = 5

4. 10 and 5 **5.** 10 and 12, **6.** 14 and 16 **7.** 14 and 16, **8.** 25 k/h **9.** 36 yrs, 9 yrs

MEDIUM LEVEL

I. MCQ   **1.** b,   **2.** c,   **3.** c,   **4.** c, 5. c

II. Assertion Reason   **1.** a

III. Case Study   **a.** 2 (x + 5),   **b.** 5x,   **c.** 20 k/h   **c. OR** 25 k/h

IV. SA I   **1. i.** x = –4a, $\dfrac{3b}{a}$ **ii.** x = $\dfrac{a}{b}, \dfrac{b}{a}$ **iii.** –1/a², 1/b²   **iv.** x = a, 1/a   **2. i.** $k \geq -\dfrac{9}{2}$, **ii.** $k \leq -4 \, or \, k \geq 4$

3. k = –6,   **4.** 40, 42, 44,   **5.** 7, 9, 11

V. SA II   **1. i.** $\dfrac{a^2 + b^2}{3}, \dfrac{b^2 - a^2}{3}$ **ii.** –9/4, –4   **iii.** 25, 1/25   **2.** k = 7/4   **3.** 10, 6   **4.** 92,

5. 27 yrs, 9 yrs, **6.** 5 cm, 12 cm, **7.** 44 k/h   **8.** 5min, 8 min,   **9.** 20 days, **10.** 100

VI. LA   **1. i.** x = $\dfrac{2a+b}{3}, \dfrac{a+2b}{3}$ **ii.** x = 1, $\dfrac{-(a-b)^2}{(a+b)^2}$ **2.** 750 km/hr,   **3.** 2.5 m   **4.** 8,15,17, P = 40 cm   **5.** 100

DIFFICULT LEVEL

I. MCQ   **1.** d,   **2.** b,   **3.** a,   **4.** c,   **5.** b

II. Assertion Reason   **1.** c

III. Case Study   **a.** Loss = 66000, **b.** 184000,   **c.** 20 or 330 barrels   **c. OR** 240250

IV. SA   **1.** $-\dfrac{8}{5} < k < \dfrac{8}{5}$

V. SA II   **1. i.** $x = \dfrac{a+2b}{3} \, or \, x = \dfrac{2a+b}{3}$ **ii.** –a, –b   **iii.** 0, 1   **4.** p = 7, k = 7/4,   **6.** 12 and 16

VI. LA   **1.** 36   **2.** 15 k/h, 20 k/h   **3.** 12 m   **4.** 14 min   **5.** Nisha = 5 yrs, Asha = 27 yrs,   **6.** 14 yrs