EXERCISE

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

EASY LEVEL

1. Which of the following is a polynomial:

a) $2x^2 + \frac{3}{x} - 5$ b) $-3x^2 + \sqrt{2x} - 5$ c) $\sqrt{2}x^2 + \sqrt{3}x - 9$ d) $x + \frac{1}{x}$

2. If one zero of the quadratic polynomial $kx^2 + 3x + k$ is 2, then the value of k is:

a) $\frac{5}{6}$ b) $-\frac{5}{6}$ c) $-\frac{6}{5}$ d) $\frac{6}{5}$

3. A quadratic polynomial, whose zeros are 5 and –8 is

a) $x^2 + 13x - 40$ b) $x^2 + 4x - 3$ c) $x^2 - 3x + 40$ d) $x^2 + 3x - 40$

4. The graph of a quadratic polynomial is:

a) line b) circle c) parabola d) ellipse

5. The product of zeroes of the polynomial $2x^2 + 7x + a,$ is 2, then a is:

a) 4 b)2 c) –4 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.

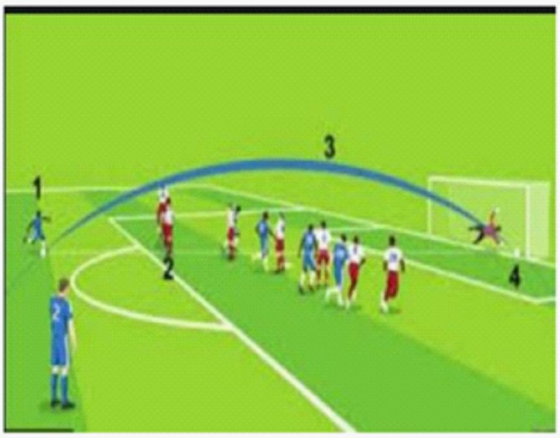
1. Statement-1(Assertion): The polynomial $x^2 + 2x - 15$ has two real zeroes.

Statement- 2(Reason): A quadratic polynomial can have at most two real zeroes.

III. CASE BASED QUESTIONS

EASY LEVEL

1. Basketball and Soccer are played with a spherical ball. Even through an athlete dribbles the ball in both sports, a basketball player uses his hands, a soccer player uses his feet. Usually, a soccer is played outdoors on a large field, the basketball is played indoor on a court made out of wood. The projectile of soccer ball and basketball are in the form of parabola representing a quadratic polynomial.



Based on the above information answer the following questions:

a) What is the shape of the path traced shown in above figures.

b) If $3x^2 + 5x - 8$ is the parabola representing the graphs shown in above figures, then what is the sum of its zeroes.

c) Find the of zeroes of the polynomial $3x^2 + 5x - 8$ representing the graph shown in above figures?

OR

Find the quadratic polynomial if its zeroes are – 4 and 5.

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

EASY LEVEL

1. Find the zeroes of the quadratic polynomial $f(x) = x^2 + 7x + 12$, and verify the relationship between the zeroes and its coefficients.
2. Find the zeroes of the quadratic polynomial $5u^2 + 10u$, and verify the relationship between the zeroes and its coefficients.
3. Find the zeroes of the quadratic polynomial $x^2 - 5$, and verify the relationship between the zeroes and its coefficients.
4. Find the quadratic polynomial whose sum of zeroes and product of zeroes are $\sqrt{2}, \frac{1}{3}$ respectively.
5. If the product of the zeroes of the polynomial $ax^2 - 6x - 6$ is 4, find the value of a.

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

EASY LEVEL

1. If α, β are zeroes of the quadratic polynomial $x^2 - 5x + k$, such that $\alpha - \beta = 1$, find the value of k.

2. If α and β are the zeroes of polynomial $x^2 - 5x + 5$, then find the value of $\alpha^{-1} + \beta^{-1}$.

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

MEDIUM LEVEL

1. The number of polynomials having –2 and 5 as zeroes is :

   a) 1 b) 2 c) infinitely many d) None of these

2. If the product of the zeroes of the quadratic polynomial $3x^2 + 5x + k$ is $\frac{-2}{3}$ then the value of k is :

   a) –3 b) –2 c) –1 d) 3

3. The zeroes of the quadratic polynomial $f(x) = x^2 + 99x + 127$ are:

   a) both positive b) both negative c) one positive and one negative d) both equal

4. If α, β are the zeroes of the polynomial $f(x) = x^2 + x + 1$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to:

   a) 1 b) –1 c) 0 d) 2

5. If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal then :

   a) c and a have opposite signs b) c and b have opposite signs

   c) c and a have same signs d) c and b have same signs

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.

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 polynomial having 1/2 and 1/3 as its zeroes is $6x^2 - 5x + 1$.

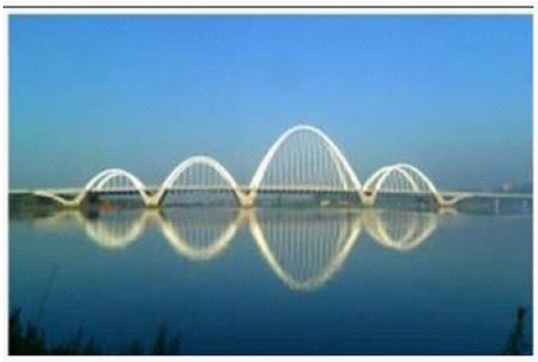
   Statement- 2 (Reason): Quadratic polynomials having α, β are zeroes are given by

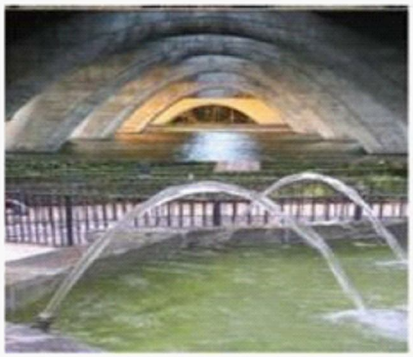
   $k\left[x^2 - (\alpha + \beta)x + \alpha\beta\right]$ where k is non-zero constant.

III. CASE BASED QUESTIONS

MEDIUM LEVEL

1. In the figures various structures are parabolic in shape. A parabola is a curve represented by a quadratic polynomial $p(x) = ax^2 + bx + c$.





Based on the above information answer the following questions:

a) In the standard form of quadratic polynomial ,$ax^2 + bx + c$, what is a, b, and c.

b) If α and $1/\alpha$ are the zeroes of the quadratic polynomial $2x^2 - x + 8k$, then find the value of k.

c) In how many points of x axis, the graph of $x^2 + 1$ intersects.

OR

If the sum of the roots is – p and product of the roots is –1/p, then find the quadratic polynomial.

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

MEDIUM LEVEL

1. Find the zeroes of the quadratic polynomial $f(x) = 6x^2 - 3$, and verify the relationship between the zeroes and its coefficients.

2. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other, find the value of a.

3. If α, β are zeroes of the quadratic polynomial $x^2 + 7x + 12$, then find the values of $\alpha^2\beta + \alpha\beta^2$, $\frac{1}{\alpha} + \frac{1}{\beta}$.

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

MEDIUM LEVEL

1. If α and β are the zeroes of polynomial $x^2 - (k + 6)x + 2(2k - 1)$, then find the value of k if $\alpha + \beta = \frac{1}{2}\alpha.\beta$.
2. If α and β are zeroes of the polynomials such that $\alpha + \beta = 24$ and $\alpha - \beta = 8$, find the quadratic polynomials.
3. If α and β are the zeroes of polynomial $x^2 - 6x + a$, then find the value of 'a' if $3\alpha + 2\beta = 20$
4. If one solution of the quadratic polynomial $3x^2 - 8x + 2k + 1$ is seven times the other. Find the solutions & the value of k.
5. If α and β are the zeroes of polynomial $3x^2 + 5x - 2$, then form a quadratic polynomial whose zeroes are 2α and 2β.
6. If α and β are the zeroes of polynomial $x^2 - 2x - 8$, then form a quadratic polynomial whose zeroes are 3α and 3β.
7. Given that the sum of the zeroes of the polynomial $(a + 1)x^2 + (2a + 3)x + (3a + 4)$ is –1. Find the product of its zeroes.
8. If α and β are zeroes of the polynomials $f(x) = x^2 - 8x + k$ such that $\alpha^2 + \beta^2 = 40$, find 'k'.
9. If α and β are zeroes of the polynomials $f(x) = kx^2 + 2x + 3k$ such that sum of zeroes is equal to the product of zeros, find the value of 'k'.
10. If α and β are zeroes of the polynomials $f(x) = 4x^2 - 8kx - 9$ such that zeroes are opposite in nature and equal in magnitude then, find the value of 'k'
11. If α, β are zeroes of the quadratic polynomial $2x^2 - 5x + 7$, find a quadratic polynomial whose zeroes are $2\alpha + 3\beta$, $3\alpha + 2\beta$.

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

DIFFICULT LEVEL

1. If α, β are the zeroes of the polynomial $f(x) = px^2 - 2x + 3p$, $\alpha + \beta = \alpha\beta$, then the value of p is:

   a) $\frac{-2}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) $\frac{-1}{63}$

2. If the zeroes of the quadratic polynomial $f(x) = (k^2 + 4)x^2 + 7x + 4k$ are reciprocal of each other, then the value of k is:

   a) 1 b) –1 c) 2 d) –2

3. If α, β are the zeroes of the polynomial $f(x) = ax^2 - 5x + c$, then the value of $\alpha + \beta = \alpha\beta = 10$ then :

   a) $a = 5, c = \frac{1}{2}$ b) $a = 1, c = \frac{5}{2}$ c) $a = \frac{5}{2}, c = 1$ d) $a = \frac{1}{2}, c = 5$

4. If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other, then it

   a) has no linear term and the constant term is negative. b) has no linear term & the constant term is positive.

   c) can have a linear term but constant term is negative. d) can have a linear term but constant term is positive.

5. If $x + 2$ is a factor of $x^2 + ax + 2b$ and $a + b = 4$, then :

   a) a =1, b = 3 b) a = 3,b =1 c) a = –1, b = 5 d) a = 5, b = –1

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): x^3+x has only one real zero.

Statement- 2(Reason): A polynomial of nth degree must have n real zeroes.

III. CASE BASED QUESTIONS

DIFFICULT LEVEL

1. In the below figure, shows the path of a diver, when she takes a jump from the diving board. Clearly, it is a parabola. Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool.

Her height above the water level at any time t in seconds is given by the polynomial $h(t) = -16t^2 + 8t + c$.

Based on the above information answer the following questions:

a) Find the value of c.

b) At what time will she touch the water in the pool?

c) If Geeta's height above the water level is given by p(t) with zeroes -1 and 2 , find p(t).

OR

A polynomial q(t) with sum of zeroes as 1 and the product as –6, is modelling Anu's height in feet above the water at any time t, find q(t).

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

DIFFICULT LEVEL

1. Find the zeroes of the quadratic polynomial $f(x) = abx^2 + (b^2 - ac)x - bc,$ and verify the relationship between the zeroes and its coefficients.

2. If α, β are zeroes of the quadratic polynomial $2x^2 + 5x + k$, satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then find the value of k for this to be possible.

3. If the graph of quadratic polynomial $ax^2 + bx + c$ cuts negative or positive direction of y axis , then what is the sign of c.

4. Can the quadratic polynomial $x^2 + kx + k$ have equal zeroes for some odd integer $k > 1$?

5. If (x + a) is a factor of two polynomials $x^2 + px + q$ and $x^2 + mx + n$, then prove that $a = \frac{n-q}{m-p}$

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

DIFFICULT LEVEL

1. If a and b are the roots of the equation $3x^2 - 4x + 1 = 0$, form the polynomial whose zeroes are a^2/b and b^2/a.

2. If α and β are the zeroes of polynomial $x^2 - 3x + 7$, then form a quadratic polynomial whose zeroes are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$

3. If α and β are the zeroes of polynomial $25p^2 - 15p + 2$, then form a quadratic polynomial whose zeroes are $\frac{1}{2\alpha}$ and $\frac{1}{2\beta}$

4. If α & β are zeroes of the polynomials $f(x)=x^2+ px + 45$ such that squared difference of the zeroes is 144 find the value of 'p'.

5. Find the zeroes of the polynomials and verify the relation between its zeroes and coefficients:

(i) $P(x) = \sqrt{3}x^2 + 10x + 7\sqrt{3}$ (ii) . $P(x) = x^2 - (\sqrt{3}+1)x + \sqrt{3}$ (iii). $P(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$

ANSWERS

EASY LEVEL

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

II. Assertion Reason **1.** a

III. Case Study **a.** Parabola **b.** –5/3, **c.** –8, 1 **c.OR** $x^2 - x - 20$

IV. SA I **1.** –3, 4, **2.** 0, –2, **3.** $\sqrt{5}, -\sqrt{5}$ **4.** $3x^2 - \sqrt{3}2x + 1$, **5.** –3/2

V. SA II **1.** k = 6, 2. 1

MEDIUM LEVEL

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

II. Assertion Reason **1.** a

III. Case Study **a.** real numbers, **b.** 1/4, **c.** no point on x axis **c. OR** $px^2 + p^2x - 1$

IV. SA I **1.** $\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}$ **2.** a =3, **3.** –84, –7/12

V SA II. **1.** $k = 7$ **2.** $k\left(x^2 - 24x + 128\right)$ **3.** $a = -16$ **4.** $\frac{1}{3}, \frac{7}{3}$ *are* $\sqrt{k} = \frac{2}{3}$

5. $3x^2 + 10x - 8$ **6.** $x^2 - 6x - 72$ 7. 2 **8.** 12

9. $\frac{-2}{3}$, **10.** k = 0, **11.** Sum = 25/2, Product = 41, Poly = $2x^2 - 25x + 82$

DIFFICULT LEVEL

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

II. Assertion Reason **1.** c

III. Case Study **a.** 48, **b.** 2 sec, **c.** $t^2 - t - 2$ **c. OR** $t^2 - t - 6$

IV. SA I **1.** c/b, –b/a **2.** k = 2 **3.** –ve direction → c –ve, +ve direction → c +ve **4.** No

V. SA II **1.** $9x^2 - 28x + 3$ **2.** $7x^2 - 3x + 1$ **3.** $8p^2 - 30p + 25$ **4.** $(\alpha - \beta)^2 = 144$

5. (i) 13. $-\sqrt{3}, -\frac{7}{\sqrt{3}}$ **(ii)** $1, \sqrt{3}$ **(iii)** $\frac{\sqrt{3}}{4}, \frac{-2}{\sqrt{3}}$