Chapter-04

Quadratic Equation

- **Quadratic Polynomial:** A polynomial of the form $ax^2 + bx + c$ is called a quadratic expression in the variable x. This is a polynomial of the second degree. In quadratic expression $ax^2 + bx + c$, a is the coefficient of x^2, b is the coefficient of x and c is the constant term (or coefficient of x°..
- **Quadratic Equation:** An equation of the form $ax^2 + bx + c = 0$, $a \neq 0$, is called a quadratic equation in one variable x, where a, b, c are constants.
- The equation $ax^2 + bx + c = 0$, $a \neq 0$ is the standard form of a quadratic equation, where a, b and c are real numbers.
- A real number α is said to be a root of the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$. If $a\alpha^2 + b\alpha + c = 0$, the zeroes of quadratic polynomial $ax^2 + bx + c$ and the roots of the quadratic equation $ax^2 + bx + c = 0$ are the same.
- If we can factorise $ax^2 + bx + c = 0$, $a \neq 0$ into product of two linear factors, then the roots of the quadratic equation can be found by equating each factors to zero.
- The roots of a quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ are given by $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, provided that $b^2 - 4ac \geq 0$.
- A quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has __________

  (a) Two distinct and real roots, if $b^2 - 4ac > 0$.

  (b) Two equal and real roots, if $b^2 - 4ac = 0$.

  (c) Two roots are not real, if $b^2 - 4ac < 0$.
- A quadratic equation can also be solved by the method of completing the square.

  (i) $a^2 + 2ab + b^2 = (a + b)^2$

  (ii) $a^2 - 2ab + b^2 = (a - b)^2$
- Discriminant of the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ is given by $D = b^2 - 4ac$.