Ch-4 Quadratic Equations

1. A Polynomial of the form $p(x) = ax^2 + bx + c$, where $a \neq 0$ and a, b, c are real numbers and x is a real variable is called a **quadratic polynomial**.
2. An equation $p(x) = 0$, where $p(x)$ is a quadratic polynomial is called a quadratic equation i.e. $ax^2 + bx + c = 0$, $a \neq 0$.
3. **Zeros of Quadratic Equations –** Those values of x for which $ax^2 + bx + c = 0$ is satisfied are called zeros of quadratic equation.
4. **Quadratic equation is classified into two categories –**
    a. Pure quadratic equation of type – $ax^2 + c = 0$, by putting $b = 0$ in $ax^2 + bx + c = 0$.
    b. Affected quadratic equation of type $ax^2 + bx + c = 0$, $b \neq 0$.
5. **Roots of Quadratic Equations –** If α, β are the zeros of the polynomial $ax^2 + bx + c$. Then α, β are called roots of corresponding equation.
   $ax^2 + bx + c = 0$
   $p(\alpha) = p(\beta) = 0$
   i.e., $a\alpha^2 + b\alpha + c = 0$, and
   $a\beta^2 + b\beta + c = 0$
6. Pure quadratic equation $ax^2 + c = 0$ can be solved by any one of the following methods –
    a. By Taking square root
    b. By factorization
7. Affected quadratic equation can be solved by any one of the following method –
    a. By splitting middle term
    b. By method of completing the square
8. $D = b^2 - 4ac$, is called the discriminant which decides the nature of roots.
    a. If $D > 0$, Roots are real and unequal.
    b. If $D = 0$, Roots are real and equal.
    c. If $D < 0$, No Real roots are possible.
9. The quadratic formula or Sridhar Acharya's formula to find the roots of $ax^2 + bx + c = 0$ is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.