Chapter – 6

Squares and Square Roots

- **Square**: Number obtained when a number is multiplied by itself. It is the number raised to the power 2. $2^2 = 2 \times 2 = 4$ (square of 2 is 4).
- If a natural number m can be expressed as n^2, where n is also a natural number, then m is a **square number.**
- All square numbers end with 0, 1, 4, 5, 6 or 9 at unit's place.
- Square numbers can only have even number of zeros at the end.
- Square root is the inverse operation of square.
- There are two integral square roots of a perfect square number.
- Positive square root of a number is denoted by the symbol $\sqrt{\ }$ For example, 3^2 =9 gives $\sqrt{9} = 3$
- **Perfect Square or Square number**: It is the square of some natural number. If $\quad = n^2$, then m is a perfect square number where m and n are natural numbers. Example: $1 = 1 \times 1 = 1^2$, $4 = 2 \times 2 = 2^2$.
- **Properties of Square number**:

  (i) A number ending in 2, 3, 7 or 8 is never a perfect square. Example: 152, 1028, 6593 etc.

  (ii) A number ending in 0, 1, 4, 5, 6 or 9 may not necessarily be a square number. Example: 20, 31, 24, etc.

  (iii) Square of even numbers are even. Example: $2^2 = 4$, $4^2 = 16$, etc.

  (iv) Square of odd numbers are odd. Example: $5^2 = 25$, $9^2 = 81$, etc.

  (v) A number ending in an odd number of zeroes cannot be a perferct square. Example: 10, 1000, 900000, etc.

  (vi) The difference of squares of two consecutive natural number is equal to their sum. $(n+1)^2 - n^2 = n + 1 + n$. Example: $4^2 - 3^2 = 4 + 3 = 7$, $12^2 - 11^2 = 12 + 11 = 23$, etc.

  (vii) A triplet (m, n, p) of three natural numbers m, n and p is called Pythagorean triplet, if $m^2 + n^2 = p^2; 3^2 + 4^2 = 25 = 5^2$