

CHAPTER 01**Number System****Some important identities:**

Let 'a' and 'b' be positive real numbers. Then,

$$(I) \sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$$

$$(II) \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}; \text{ if } b \neq 0$$

$$(III) (\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b}) = a - b$$

$$(IV) (a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$$

$$(V) (\sqrt{a} \pm \sqrt{b})^2 = a^2 \pm 2\sqrt{ab} + b$$

$$(VI) \sqrt{a + b + 2\sqrt{ab}} = \sqrt{a} + \sqrt{b}$$

$$(VII) (\sqrt{a} + \sqrt{b})(\sqrt{c} + \sqrt{d}) = \sqrt{ac} + \sqrt{ad} + \sqrt{bc} + \sqrt{bd}, \text{ where 'c' and 'd' are positive real numbers.}$$

Note:

Let $(a > 0)$ be a real number and 'n' be a positive integer, such that $a^{\frac{1}{n}} = \sqrt[n]{a}$ is a real number, then 'n' is called exponent, 'a' is called radicand and ' $\sqrt{}$ ' is called radical sign. Here, $\sqrt[n]{a}$ is called a surd.