Chapter – 12

Exponents and Powers

- Numbers with negative exponents obey the following laws of exponents.

   (a) $a^m \times a^n = a^{m+n}$

   (b) $a^m \div a^n = a^{m-n}$

   (c) $\left(a^m\right)^n = a^{mn}$

   (d) $a^m \times b^m = (ab)^m$

   (e) $a^0 = 1$

   (f) $\dfrac{a^m}{b^m} = \left(\dfrac{a}{b}\right)^m$

- Very small numbers can be expressed in standard form using negative exponents.

- Use of Exponents to Express Small Number in Standard form:

   (i)   Very large and very small numbers can be expressed in standard form.

   (ii)   Standard form is also called scientific notation form.

   (iii)   A number written as $m \times 10^n$ is said to be in standard form if m is a decimal number such that $1 \le m < 10$ and n is either a positive or a negative integer.

   Examples: $150,000,000,000 = 1.5 \times 10^{11}$.

- Exponential notation is a powerful way to express repeated multiplication of the same number. For any non-zero rational number 'a' and a natural number n, the product $a \times a \times a \times \ldots\ldots\ldots \times a\,(n\,times) = a^n$. It is known as the nth power of 'a' and is read as 'a' raised to the power n'. The rational number a is called the base and n is called exponent.