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) $^{0} = 1$

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

- 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 = 1.5×10^{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 $a \times a \times a \times .\quad (\quad \times a\ n) times = a^{n}$. 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.