Course Title:Physical Chemistry
Course code:CHEM-5101

## FUNCTIONS IN MATHEMATICS

FUNCTION

Function, in Mathematics, an expression, rule, or law that defines a relationship between one variable (the independent variable) and another variable (the dependent variable). Functions are ubiquitous in Mathematics and are essential for formulating physical relationships in the sciences. The modern definition of function was first given in 1837 by the German Mathematician Peter Dirichlet

- If a variable y is so related to a variable x that whenever a numerical value is assigned to x, there is a rule according to which a unique value of y is determined, then y is said to be a function of the independent variable x.

- When two variables are related to each other, the dependent variable is called the function of independent variable.

    e.g; the volume of a sphere is a function of its radius and the   volume of a gas is a function of its pressure.

- This relationship is commonly symbolized as y = f(x). In addition to f(x), other abbreviated symbols such as g(x) and P(x) are often used to represent functions of the independent variable x, especially when the nature of the function is unknown or unspecified.

What is a Function?

- A function relates an input to an output.
- It is like a machine that has an input and an output.

- **f(x) = ...** " is the classic way of writing a function.
  And there are other ways, as you will see!

- **Some Examples of Functions**

- f(x) = x² (squaring) is a function
- f(x) = x³+1 is also a function

Function is Like a Machine
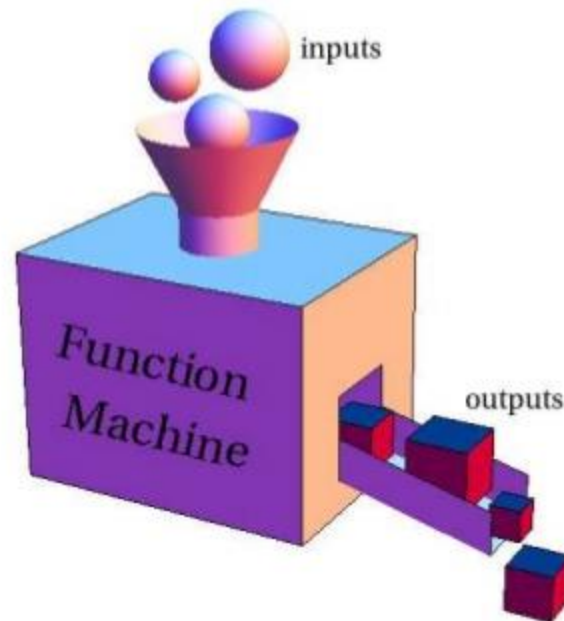
Expression of Functions

- When treating generally of functional relations, letters like x and y are commonly employed to represent variable quantities.

- Thus, in the expression

$$y=x^2+3x \quad \text{if,}$$

when any value be assigned to x, there is always a corresponding value of y, then y is said to be expressed as a function of x.
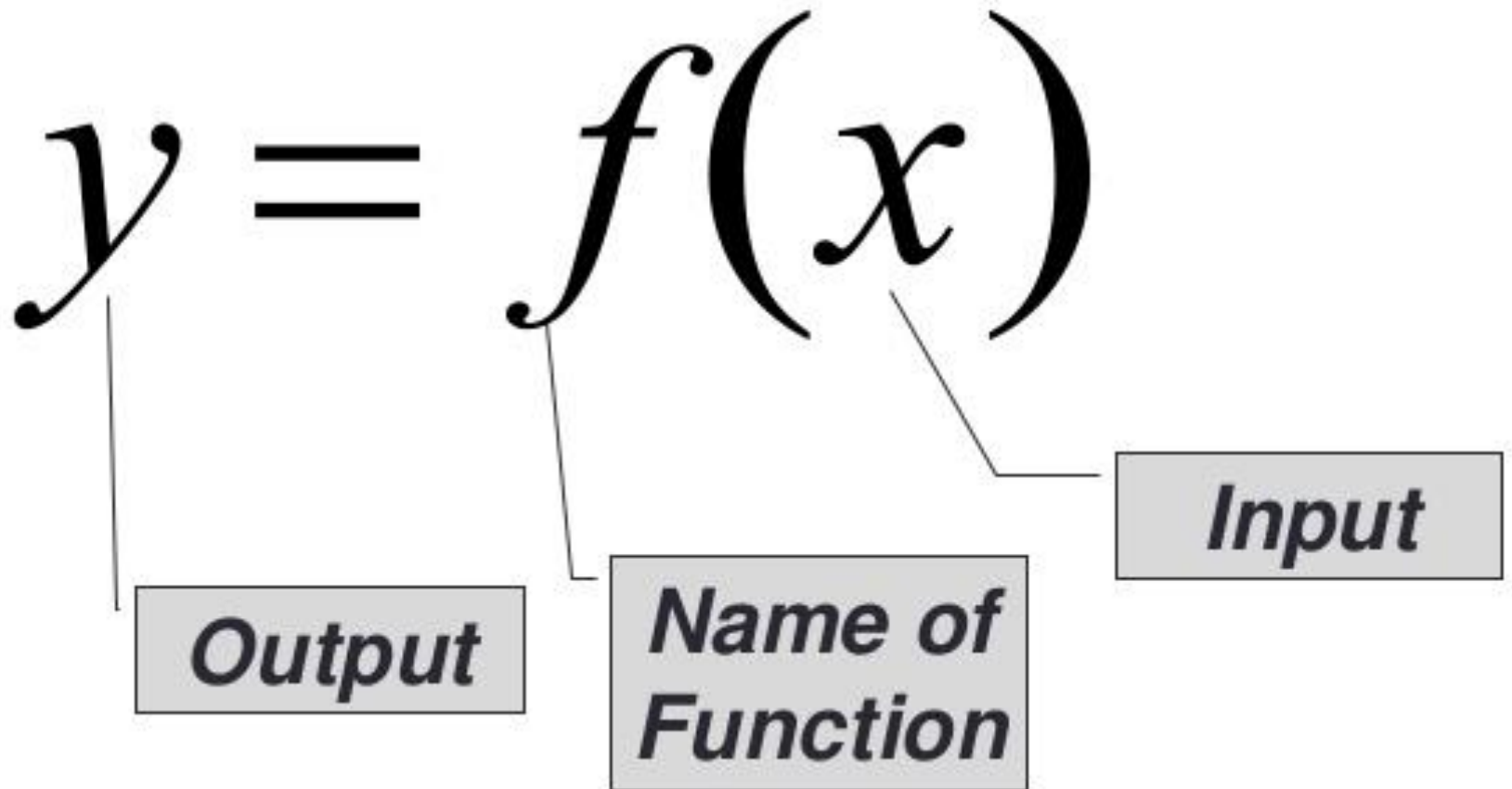
Contd….

- Similar examples are;

$$Y = \sqrt{x^2 + 5}$$

$$y = \log_{10} x$$

$$y = \sin x + \cos x$$

- These equations are the functional relations from which the values of the functions can be determined corresponding to known assigned values.

Function Notation

$$y = f(x)$$

Output

Name of Function

Input

Value of a Function

- The value of a function f(x) when x has a value 'a' is denoted by f(a) and is obtained by replacing 'x' by 'a'in the functional relation.

  For example; if

  $f(x)=x^2.4x+5$

  $f(0)=(0)^2.4(0)+5=5$

  $f(1)= (1)^2.4(1)+5=9$

Variation of Function

1. **Algebraic function**

   Algebraic function are two kinds of

   *Polynomial function

   Ex: $y=x^2+5x-9$

   *Rational function

   Ex: $R(x) =\frac{p(x)}{q(x)}, q(x) \neq 0$

2. **Trigonometric function**

   Example: $y=\sin x$

3. **Exponential function**

Example: $y = e^x$

4. **Logarithmic function**

Example: $y = \log x$

Question

- Find the output of the function $g(t) = 6t^2 + 5$, When;
- (i) $t = 0$
- (ii) $t = 2$

How to make your practical Notebooks

13 November 2020   **Friday**

Experiment Title: