Numerical Method

OR

Numerical Analysis

OR

Numerical Computing

OR

Computing Method

Topics to Cover

1) What is numerical Method?

2) Why we study numerical Method?

3) Where it is used?

4) Numeric Data.

5) Process of numerical Computing

6) Mathematical Equation.

7) Characteristics of numerical computing.

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▶ Start Practicing

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① What is Numerical Method or Numerical Analysis?

→ Numerical Method or Numerical Analysis or Numerical Computing is an approach for solving complex mathematical problems using simple arithmetic operations.

• It involves formulation of mathematical model, algorithms and Computation techniques to approximate solutions to mathematical problems.

$$2x + 3y = 5 \quad \textcircled{1} \quad \times 2$$
$$6x + 2y = 15 \quad \textcircled{11} \quad \times 3$$

$$4x + 6y = 10$$
$$18x + 6y = 45 \quad \text{(Sub)}$$
$$\overline{- \quad - \quad -}$$
$$-14x = -35$$
$$x = \frac{35}{14} = \boxed{2.5}$$

$$y = \frac{5 - 2 \times 2.5}{3}$$
$$= \frac{5 - 5}{3} = \boxed{0}$$

$$\boxed{xe^x - \cos x = 0}$$

$$x^2 - 6x + 8 = 0$$
$$\Rightarrow x^2 - (4+2)x + 8 = 0$$
$$\Rightarrow x^2 - 4x - 2x + 8 = 0$$
$$\Rightarrow x(x-4) - 2(x-4) = 0$$
$$\Rightarrow (x-4)(x-2) = 0$$
$$x = 4$$
$$x = 2$$

② Why we study Numerical Method?

→ Practical Problem Solving.

→ Handling Complex Equations.

→ Error Analysis and Control.

→ Research and Development.

→ Provide approximate solution.

③ Where it is used?

→ finding roots of equations.

→ Solving system of linear equation.

→ Interpolation and regression analysis.

→ Numerical Integration.

→ Numerical Differentiation.

→ Boundary value problems.

→ Solution of matrix problems.

④ Numeric Data :

Numerical computing may involve two types of data.

a) Discrete Data

b) Continuous Data

a) <u>Discrete Data</u> : Data that are obtained by counting are called discrete data.

eg. total no. of items in a box or total no. of students in a class.

b) <u>Continuous Data</u> : Data that are obtained through measurement are called continuous data.

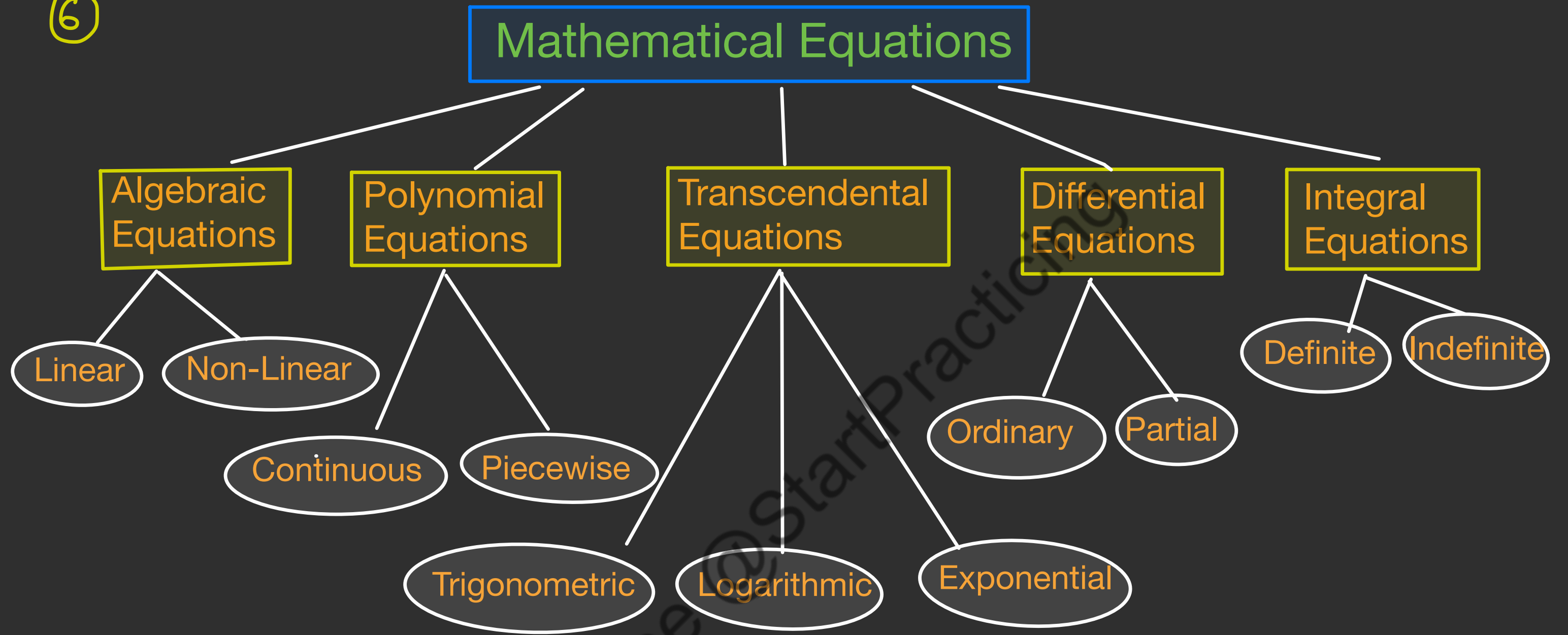eg. Speed of a car or temperature of a patient.

⑤ Process of Numerical Computing :

We can roughly divide the process of numerical computing into four phases.

a) formulation of mathematical model.

b) Construction of appropriate NM.

c) Implementation of method.

d) Validation of solution.

Different forms of Mathematical Equation.

(7) **Characteristics** of **Numerical Computing**

a) Accuracy

b) Rate of Convergence

c) Numerical Stability

d) Efficiency.