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In this paper the relevance of differential equation in engineering through their application in various engineering discipline and various types of differential equation are motivated by engineering application theory and techniques for solving differential equations are applied to solve practical engineering problem.

INTRODUCTION :-

The differential equations have wide applications in various engineering and science discipline. In general modeling of the variation of physical quantity such as temperature, pressure, displacement, velocity, stress, strain, current, voltage or concentration of pollutant with change of time, location or both would result in differential equations. Similarly studying the variation of some physics quantities on other physics quantities would also lead to differential equation.

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Applications of ODE's.

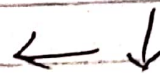
- ① Newton's law of cooling
- ② Beam
- ③ Physical Application.
- ④ Radio Active element
- ⑤ Electrical circuit
- ⑥ No Damping
- ⑦ Light Damping
- ⑧ Heavy Damping
- ⑨ Modeling Free mechanical oscillations.
- ⑩ Modeling Forced mechanical oscillations.
- ⑪ Computer exercise or Activity
- ⑫ Modeling with first-order equations

⇒ NEWTON'S Second Law:-

The rate change in Momentum Encountered by A moving object is equal to net force applied to it in mathematical term.

$$F = \frac{d(mv)}{dt} \rightarrow m \frac{dv}{dt} + v \frac{dm}{dt} \Rightarrow F = m \frac{dv}{dt}$$

$$F = ma.$$



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Physical Application ODE

i- its velocity (v) = $\frac{dx}{dt}$

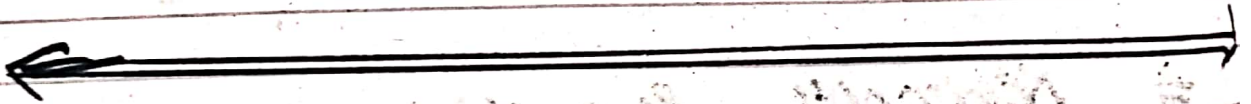
ii - its acceleration = $\frac{dv}{dt}$ or

$$\frac{d^2x}{dt^2} \text{ or } v \frac{dv}{dx}$$

if however, the body be moving along a curve, then

i- its velocity (v) = $\frac{ds}{dt}$ or

$$v \frac{dv}{ds} \text{ or } \frac{d^2s}{dt^2}$$



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APPLICATION OF (P.D.E)

PDE is mathematical equation that involves two or more independent variable an unknown function. (depend on those variable) and partial derivatives of the unknown function with respect to the independent variable. the order of partial differential equation is the order of the highest derivative involved. A solution (or a particular) to a partial differential equation is a function that solves the equation. or in other word. turns ~~it~~ it into contains all particular - identity when the substituted in to the equation. A ~~a~~ solution called general if it is contains all particular solution of the equation concentration.

the term exact solution is often used for second - and higher - order non linear PDEs. ~~to P~~ denote a particular solution.