



SYSTEM SIMULATION AND  
MODELLING

# LECTURE 1

## Section A

TOPIC COVERED: Introduction to Simulation: System & System Environment, Advantages and Disadvantages of Simulation, Areas of Application.

# Introduction to System Modeling and Simulation

- System modeling and simulation has become one of the important subject in the industry as well as defense. It helps an engineer or a scientist to study a system with the help of mathematical models and computers.

- **System:** A system is defined as an aggregation or assemblage of objects joined in some regular interaction or interdependence.

OR

- A system is a collection of elements or components that are organized for a common purpose.
- **Modeling:** Modeling is a method of solving problems in which the system under study is replaced by a simple object that describes the real system and its behavior.
- **System modeling:** System modeling is the interdisciplinary study of the use of models to conceptualize and construct systems in business and engineering development.
- **Simulation:** A simulation is essentially the imitation of a real world system.
- **System simulation:** System simulation is a set of techniques that use computers to imitate the operations of various real world tasks or processes through simulation.

- **A system is a unit or process, which exists and operates in time and space through the interaction of its parts.**
- **Model is a simplified representation of a real or theoretical system at some particular point in time or space intended to provide understanding of the system**
- **Simulation is the manipulation of a model in such a way that it operates in time or space to summarize it.**

## NEED AND USE OF SIMULATION

- Using simulations is generally cheaper and safer than conducting experiments with a prototype of the final product.
- Simulations can often be even more realistic than traditional experiments.
- Simulation can often be conducted faster than real time.
- Simulation allows us to solve problems in any area: manufacturing, logistics, finance, health and many others.

# Advantages of Simulation

- There are following advantages offered by a simulation model:
- One of the primary advantages of simulators is that they are able to provide users with practical feedback when designing real world system.
- This allows the designer to determine the correctness and efficiency of a design before the system is actually constructed.
- Provide a tool to study rare events in a manufacturing system and study their impacts.
- This permits the system designer to study problem at several different levels of abstraction.
- Simulation is generally cheaper and safer than real time experiment.