Previous Solve

Sat / Sun / Mon / Tue / Wed / Thu / Fri

Date :...../...../.....

① Define System Simulation.

Geoffrey Gorden has defined System Simulation as "the technique of solving problems by observing the performance, over time of a dynamic model of the system."

② Describe different type of Simulation models.

There are three type of Simulation model

i. static or dynamic.
ii. deterministic or Stochastic
iii. disencte or continuous.

Static or dynamic:

Static Simulation model represents a system, which does not change the time. Also known as Monte-Carlo Simulation.

Dynamic Simulation change overtime.
Example: Repair a shop over a month.

Sat / Sun / Mon / Tue / Wed / Thu / Fri

Date :...../...../.....

deterministic or stochastic:

Deterministic Models have known set of input, which result into unique set of outputs.

In stochastic model there are one or more random input variables, which lead to random outputs.

Discrete or continuous:

The state change suddenly at discrete point in time are called discrete systems.

System in which the state of the system changes continuously with time are called continuous system.

Sat / Sun / Mon / Tue / Wed / Thu / ...

Date :...../...../.....

③ What are the advantages of Simulation ?

1. Simulation helps to learn about a real system, without having the system at all.
2. In many ~~system~~ situations - experimenting with an actual system may not be possible at all. We do by simulation.
3. Computer simulation can compress the performance of a system over years into few minutes of computer running time.
4. Simulation is easier to use than mathematical model.
5. Simulation is very good ~~tool~~ tool for training.
6. Simulation model are comparatively flexible.
7. Simulation being relatively free from mathematics can easily understood by non technique person.

Sat / Sun / Mon / Tue / Wed / Thu / Fri

Date :...../...../.....

④ Describe the applied area of Simulation.

1. Manufacturing
2. Business
3. Military
4. Health care applications.
5. Communication applications.
6. Computer applications.
7. Economic application
8. Transportation application.
9. Environmental application.
10. Biological applications.

Sat / Sun /

Date :...../...../.....

(5) Define Computer Simulation Models.

Computer Simulation model is a mathematical of real world system that is implemented on a computer.

(06) Describe the steps in simulation study.

(i) problem formulation
(ii) Model construction
(iii) Data collection
(iv) Model programming
(v) Validation
(vi) Design of experiment
(vii) Simulation run and analysis
(viii) Documentation
(ix) Implementation.

Sat / Sun / Mon / Tue / Wed / Thu / Fri

Date :...../...../.....

Masud Sir

⑦ Define following terminologies:

(i) System:

A system is defined to be a collection of entities (e.g. people or machines) that act and interact together toward the accomplishment of some logical end.

(ii) Model:

A simulation model is a simplified representation of a real world system.

(iii) Simulation:

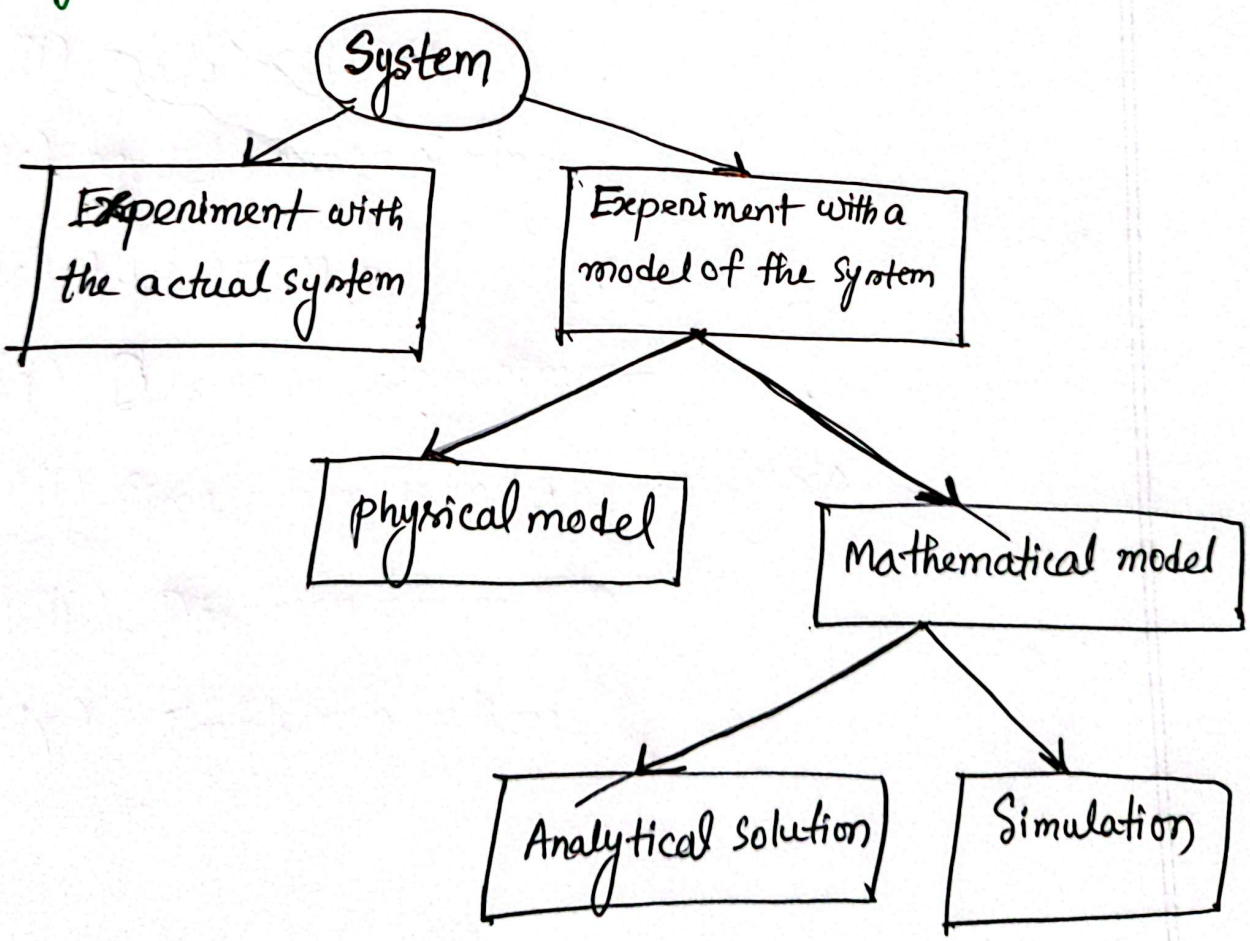
- Simulation is the representation of a real life system by another system, which depicts the important characteristics of the real system and allows experimentation on it.
- Simulation is an imitation of the reality.

Date :...../...../.....

(iv) Analytical Solution:

If the relationships that compose the model are simple enough, it may be possible to use mathematical methods to obtain exact information on question of interest, this is called an analytic solution.

(7) Demonstrate different ways in which a system might be studies.



Sub.: SAT SUN MON TUE WED THU FRI

DATE: / /

1. Define distributed simulation. Write down the difference between monte-carlo and stochastic simulation

Distributed simulation → Distributed simulation refers to the integration of high-performance computing and distributed objects, which provides a common framework for time stepped, real-time and event driven simulations.

Here I differentiate in between monte-carlo and stochastic simulation. Monte-carlo simulation and stochastic simulation are both methods used to analyze system that involve randomness and uncertainty.

	Monte-carlo	stochastic
purpose:	It's a computational technique used to estimate the behavior of a system by generating a large numbers of random samples	→ It refers to any simulation that incorporate, randomness or uncertainty into the model.
Methodology	→ Here you create a model of the system and then simulate it many times.	→ In stochastic simulation, the system is modeled as a stochastic process. ~~where the state of the system~~ depends on both deterministic Random

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

Application:	Are commonly used in finance, risk analysis and engineering.	Are commonly used in epidemiology, and environmental modeling.
Key feature:	focus on the statistical properties, such as mean, variance & probability distribution	focus on how the system evolves overtime under the influence of randomness.

2. what is stochastic process?

A stochastic process is a mathematical framework used to describe systems that evolve over time in a random manner. It consists of a collection of random variable each representing the state of the system at different point in time or space.

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

3. Define simulation. Describe the applications of simulation in computer science.

Ans:

simulation :→ simulation is the process of creating a computer based model of a real-world system in order to study its behavior under different conditions.

simulation play a critical role in computer science. Here are some key applications of simulation in computer science

1. Network simulation
2. Algorithm testing.
3. Debugging and validation.
4. Training Models.
5. Reinforcement Learning
6. Virtual machine performance.
7. Attack simulation.
8. Hardware simulation
9. VLSI logic circuit.

Etc are the field where simulation is applied.

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

1. what is real-time simulation ? Describe the steps on simulation study.

Ans:

Real-time simulation :⟶ Real time simulation refers to the process of running a simulation in which the time closely to real-world time.

Here I describe the steps in simulation study

1. Problem formulation
2. Model construction
3. Data collection
4. Model performing
5. Validation.
6. Design of experiment.
7. Simulation run and analysis
8. Documentation
9. Implementation.

5. what do you mean by system simulation →

Geoffrey Gordan has defined system simulation as "The technique of solving problems by observation of performance over time, of a dynamic model of the system. Dynamic model and the time element are two important components of the system simulation.

6. Define computer simulation models. Describe the steps in simulation study.

A computer simulation model is a digital representation of a real-world system, process or phenomenon that is created and run on a computer to study its behavior, predict outcomes and analyze various scenarios.

Here I describe the steps in of simulation study —

1. Problem formulation
2. Model construction
3. Data collection.
4. Model performing
5. validation
6. Design of experiment
7. simulation run and analysis.

Sub.: SAT SUN MON TUE WED THU FRI

DATE: / /

8. Documentation.

9. Implementation.

7. (i) Comparison between static & Dynamic simulation →

Static simulation	Dynamic simulation
→ static simulation is a type of simulation where the model represents a system or process in a state that does not change over time.	→ A dynamic simulation is a type of simulation that model the behavior of a system or process over time.
→ Generally simpler to model and compute.	→ More complex to model and compute.
→ Provides a single set of results	→ Provide a time series or trajectory of results.
→ Involves algebric equation optimization technique and static models.	→ Involves differential equations, difference equations or discrete-event model.

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

(ii) Comparison Analytical solution and simulation:

Analytical	simulation
→ Analytical solution involves solving a problem using mathematical formulas	→ simulation involves using computational models to approximate the behaviors of a system overtime.
→ Provides an exact solution.	→ Provides an approximate solution.
→ Highly precise, with no numerical errors.	→ Less precise due to potential numerical errors.
→ Requires minimal computational resources.	→ Requires significant computation resources
→ Time consuming to drive the solution.	→ More time consuming both in setup and computation.
→ less flexiable.	→ Highly flexiable

Example: $d = rt$ means multiplication of velocity with time is equal to the distance.

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

8. Discuss about the component used in next event time advance approach.

Answer:→

There are several components are used in next event time advance approach these are

1. simulation clock.
2. Event list.
3. Event Routine.
4. State variable.
5. statistical counter.
6. Initialization Routine.
7. Termination condition.
8. Output Routine.
9. Random numbers generator.

Next event time advance mechanisms—

t_i = time of arrival of the i_{th} customer ($t_0 = 0$)

$A_i = t_i - t_{i-1}$ = Interarrival time.

S_i = time that servers actually spends

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

D_i = Delay in queue of ith customers

$C_i = t_i + D_i + S_i$

e_i = time of occurance.

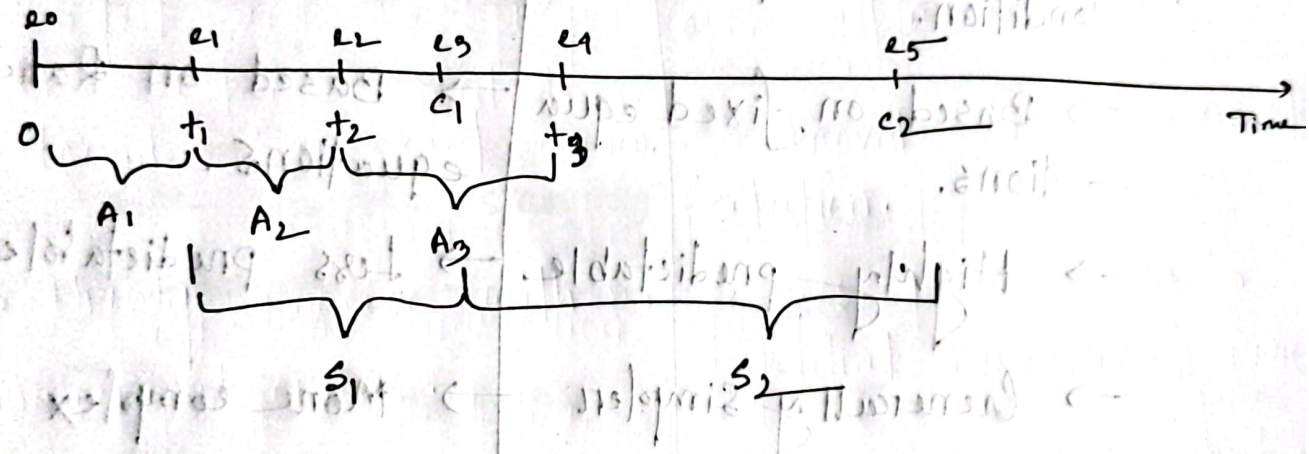


figure: The next-event time advanch approach

Sub.: _____ SAT SUN MON TUE WED THU FRI

DATE: / /

5. Deterministic vs. stochastic simulation model

Deterministic	stochastic
→ In which the behavior and outcomes are entirely determined by the initial condition.	→ Considers with randomness and portability distribution
→ Based on fixed equations.	→ Based on Random equations.
→ Highly predictable	→ less predictable.
→ Generally simpler	→ More complex due to random processes.
→ Easier to interpret.	→ Requires statistical analysis to interpret.

United

Sub.:

SAT SUN MON TUE WED THU FRI

DATE: / /

10. Continuous Vs. Discrete simulation Models →

Continuous	Discrete
→ Time progresses continuously.	→ Time progress in discrete steps or jump.
→ used in differential or integral equation.	→ used in difference equation, state machine or event-driven models.
→ state changes smoothly and continuously	→ state changes at discreate interval.
→ Time is treated as continuous variable	→ Time is treated as sequence of discrete point.
→ Mathematically complex	→ less complex
→ Example: Engineering, economies, Biology	→ Example: computer science, logistics, operations Research.