



Date: /9/2017

Time: 3 hours

Lecturer: Assist. Prof. Dr. Hanaa M. A. Salman

2016-2017

Subject: Simulation & Modeling

Class: 4th

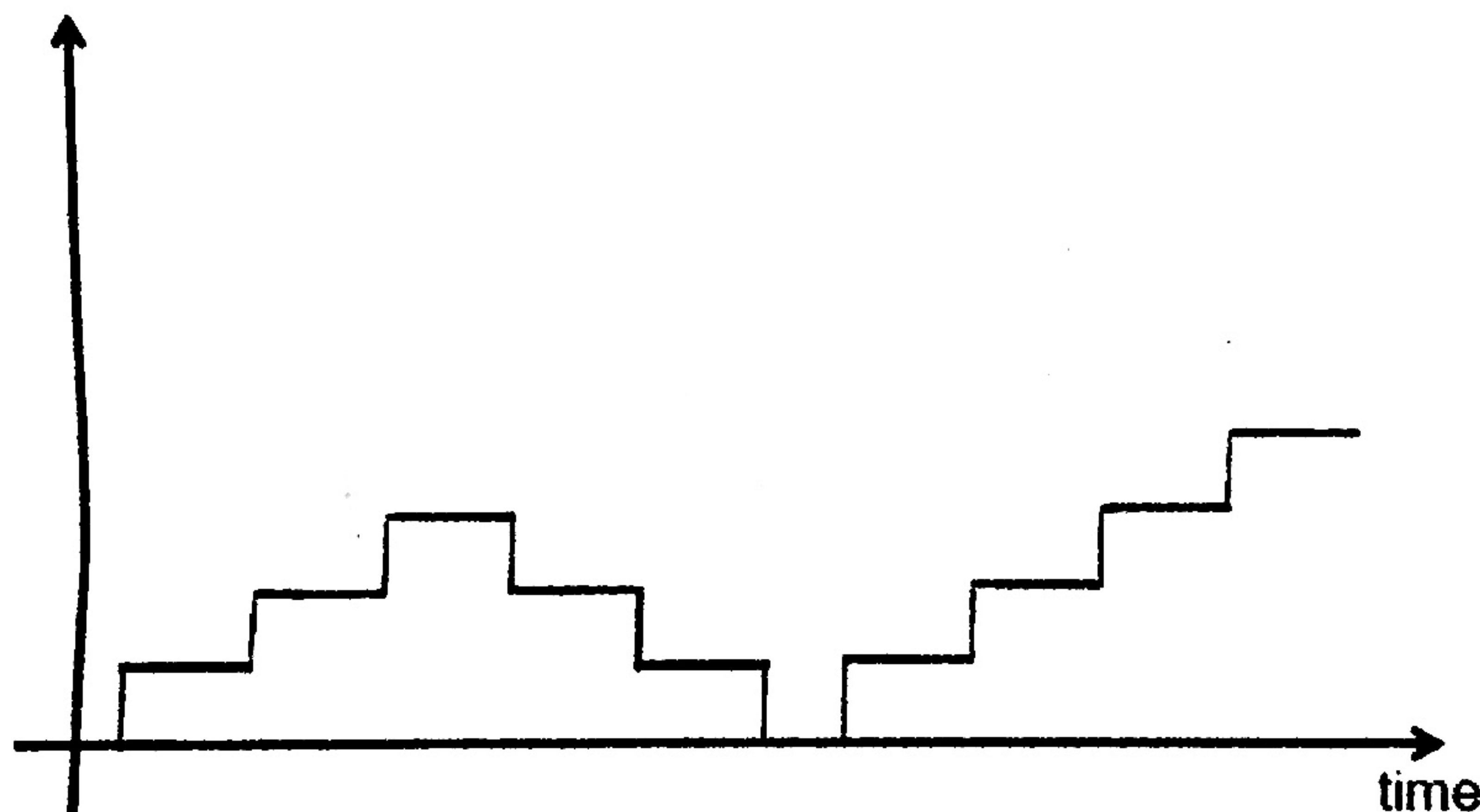
Branch: Software & Multimedia

Q1: (20 mark)

What is the framework for modeling systems by discrete-event simulation?

- A system is modeled in terms of its state at each point in time
- This is appropriate for systems where changes occur only at discrete points in time

System state



Q2: List out, with mathematical example, or block diagram if applicable to advise (20 marks)

1. Types of systems

Systems can be classified through the affected systems in time to continuous or intermittent systems:

- Discrete systems** are of changes in the case of variable rate or qualities at intermittent points is constant During a period of time
- Continuous systems** is of changes in one or more of the variable rate on an ongoing basis during the period of time

Good Luck

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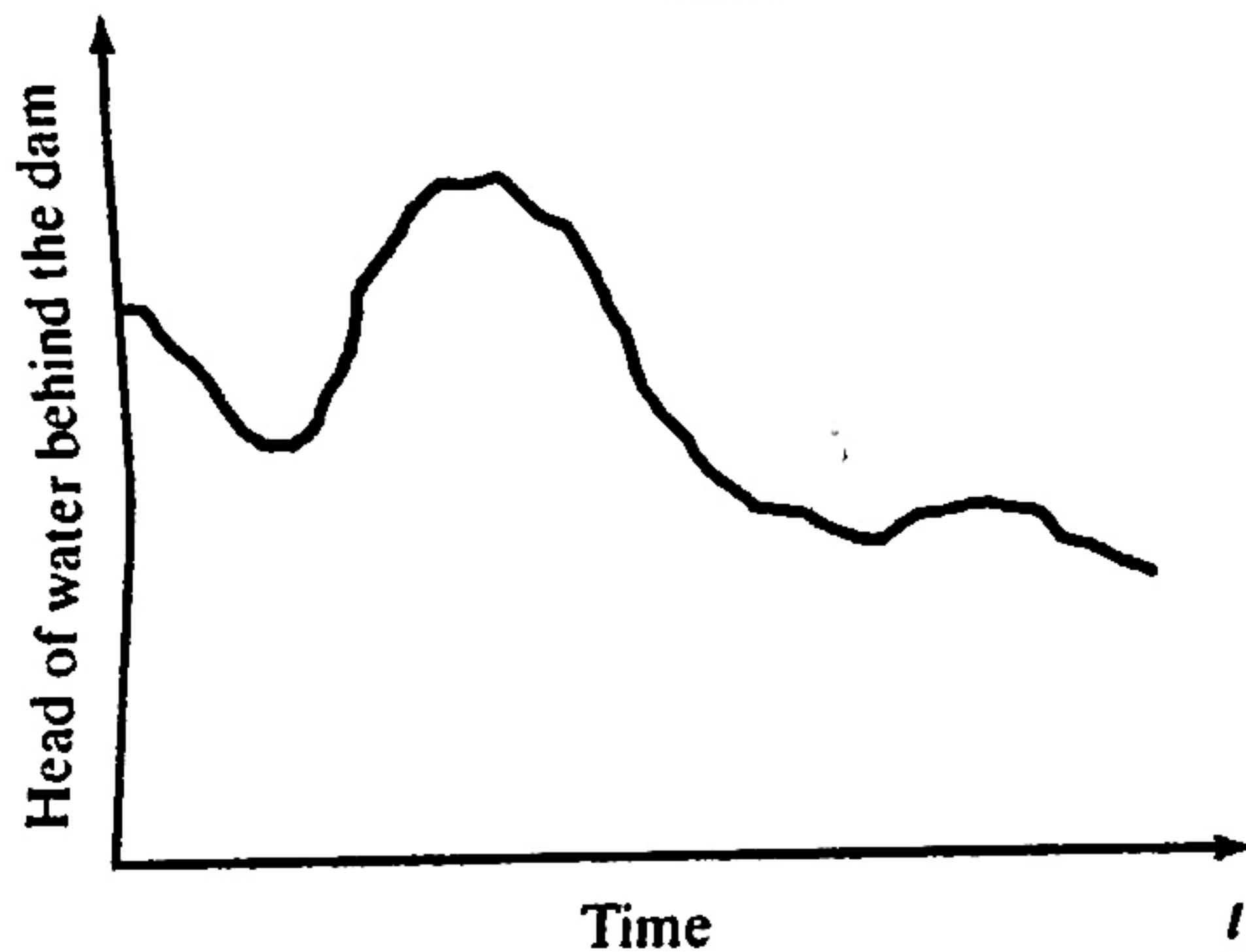
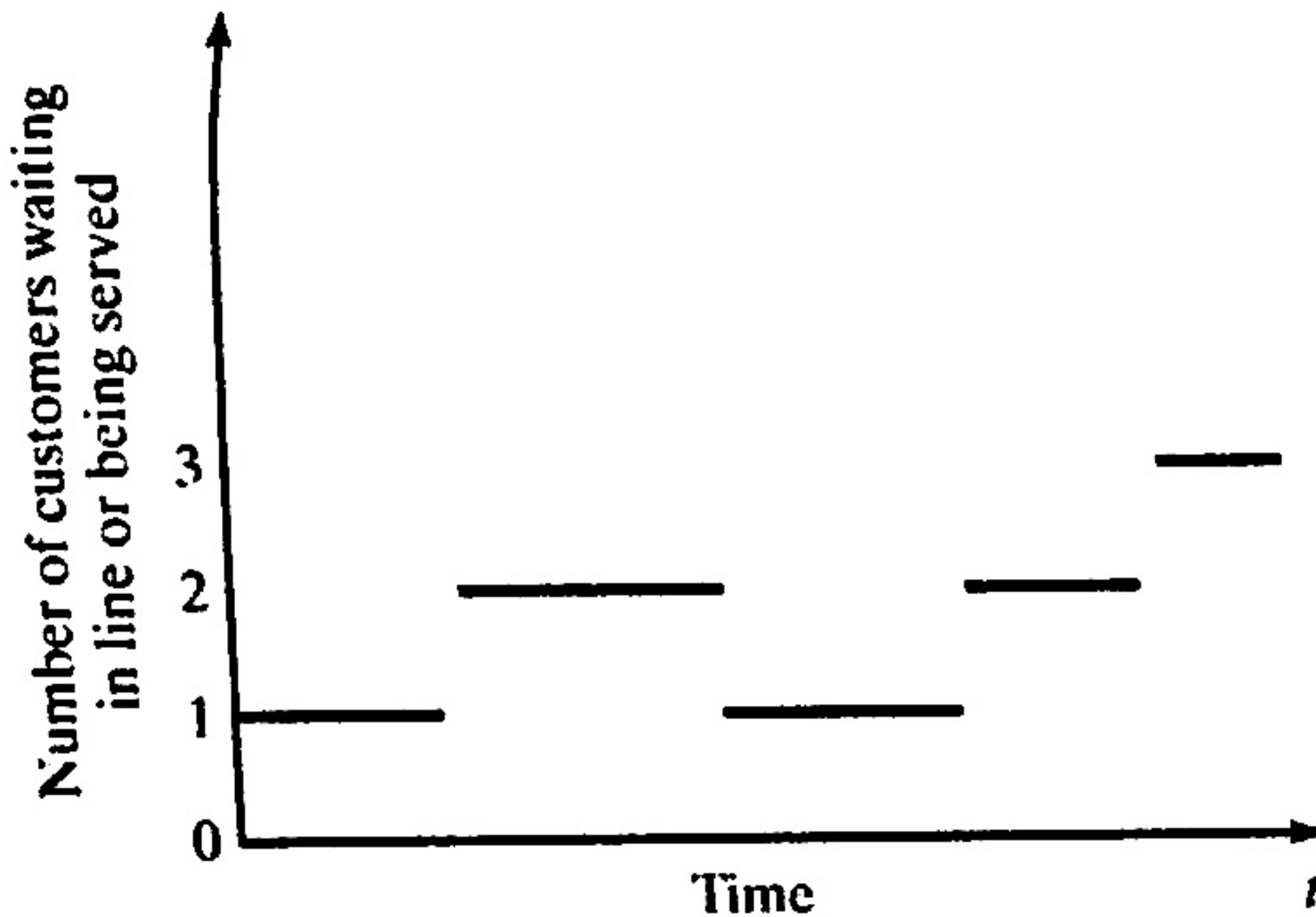
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2. Model of a system

Model: construct a conceptual framework that describes a system

3. Types of models

- a) **Physical models:** They represent physical systems and the construction process is very expensive
- b) **mathematical models:** They used symbols and mathematical equations to represent the system and the simulation model is a kind

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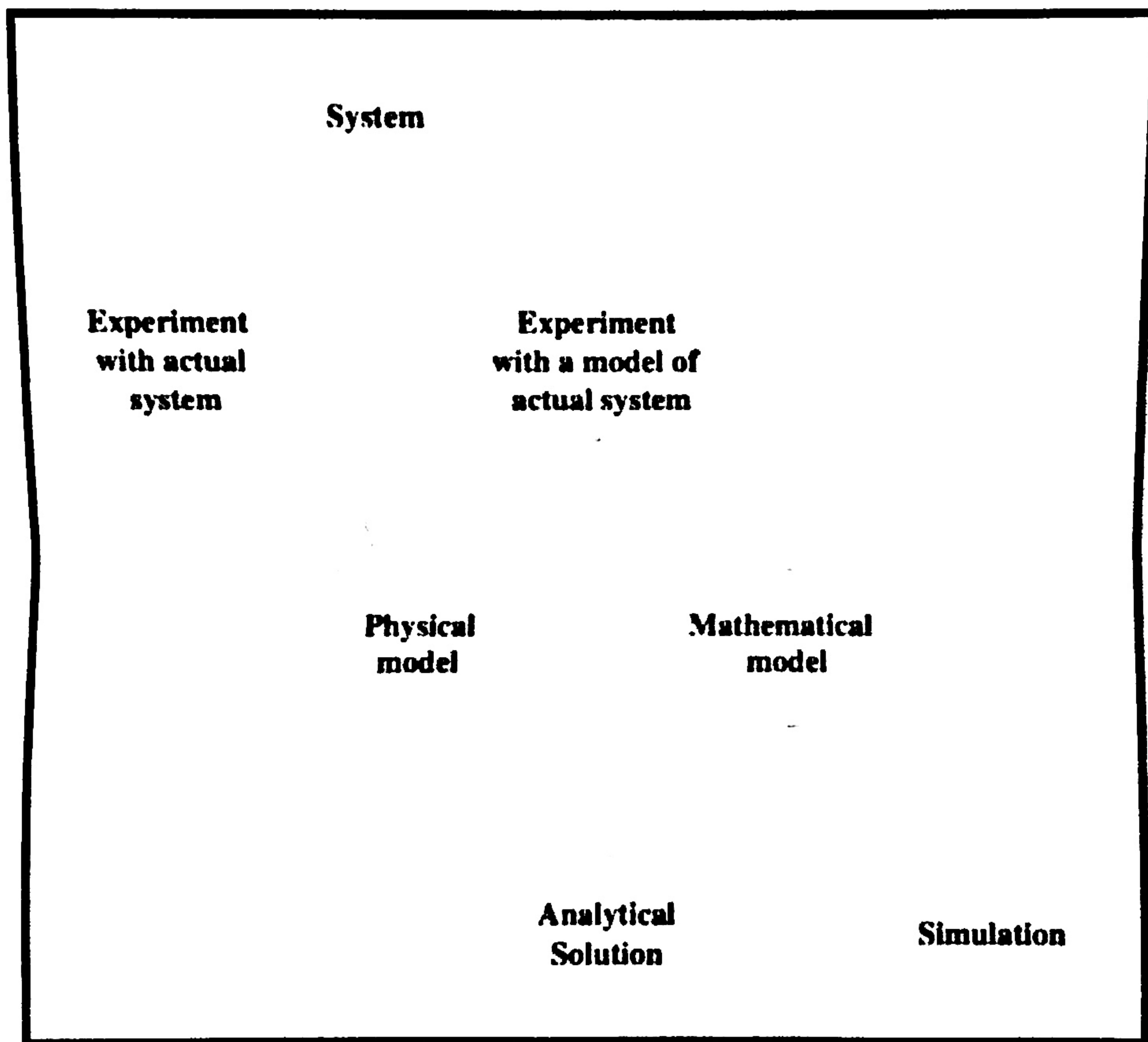
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4. Steps in a simulation study

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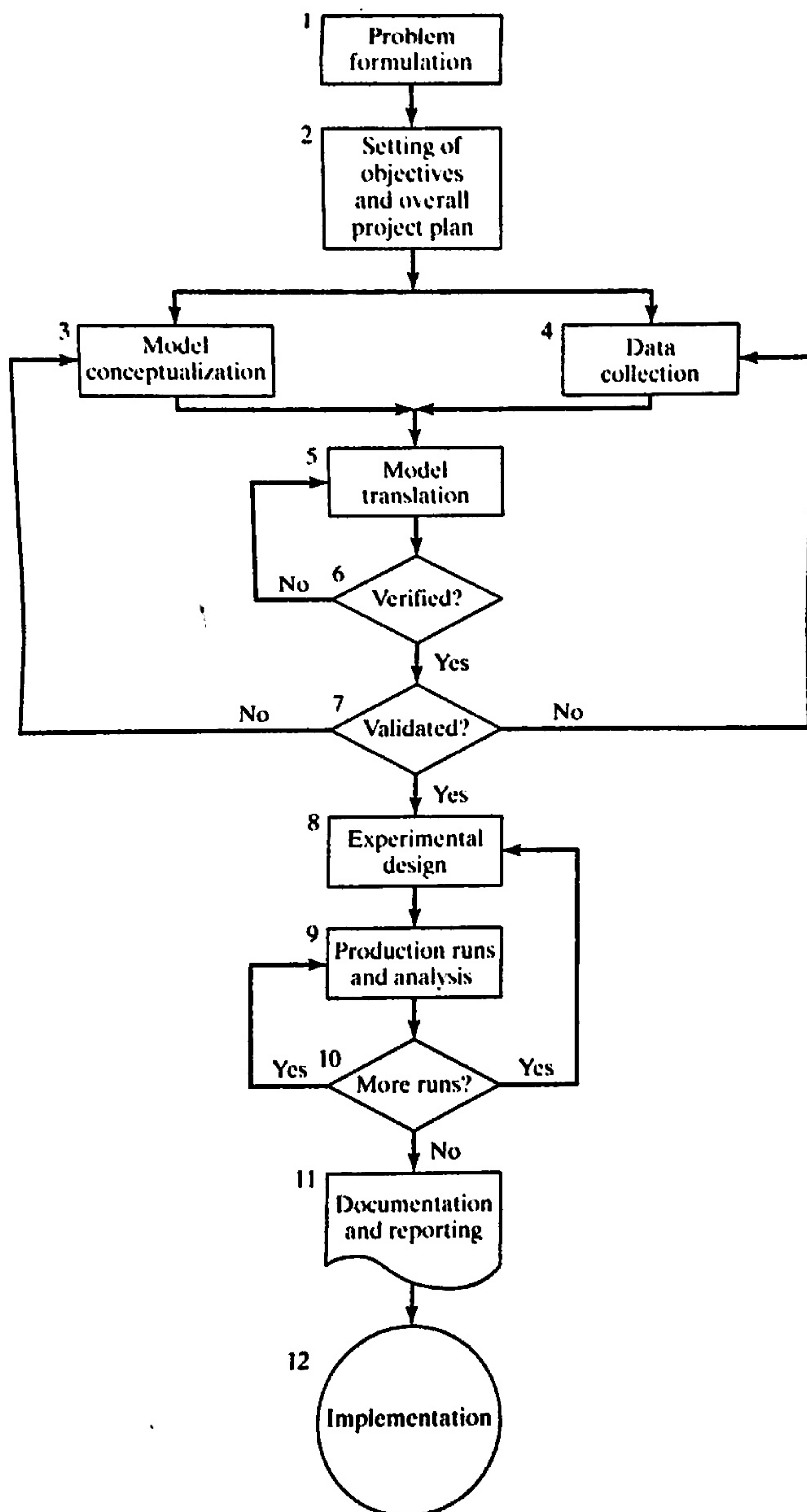
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5. The subsequent testing for randomness

■ Two categories:

□ Testing for uniformity:

$$H_0: R_i \sim U[0, 1]$$

$$H_1: R_i \not\sim U[0, 1]$$

- Failure to reject the null hypothesis, H_0 , means that evidence of non-uniformity has not been detected.

□ Testing for independence:

$$H_0: R_i \sim \text{independently}$$

$$H_1: R_i \not\sim \text{independently}$$

- Failure to reject the null hypothesis, H_0 , means that evidence of dependence has not been detected.

- Level of significance α , the probability of rejecting H_0 when it is true:
$$\alpha = P(\text{reject } H_0 | H_0 \text{ is true})$$

Q3: (20) marks

1. When Simulation Is Not Appropriate:

- When the problem can be solved by common sense.
- When the problem can be solved analytically.
- If it is easier to perform direct experiments.
- If cost exceed savings.
- If resource or time are not available.
- If system behavior is too complex. Like human behavior

2. For what purpose a models are used for

- Facilitate understanding:** be the simplest model of the system which is understood more easily if the representation of its, and the relationships between them in a simplified manner.

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- b) Facilitate contact: Once you understand the existing resolve the problem of the system often need to connect this understanding, to others.
- c) To predict the future: mathematical model can predict what can happen in the future but It may not be 100% accurate in this case.
- d) Called activity using the simulation model

Q4: (20) marks

Apply simple simulation mechanism to a system with single queuing system and singular server.

The student can give any appropriate example

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