

SOMAIYA VIDYAVIHAR UNIVERSITY
K. J. Somaiya College of Engineering, Mumbai -77
(A Constituent College of Somaiya Vidyavihar University)

Batch: A1 Roll No.: 16010121045

Experiment / Assignment / Tutorial No: 3

Experiment: 3

Title: Simulation of (M, N) - Inventory System: Refrigerator Inventory Problem

Problem Statement: The simulation of an (M, N) inventory system follows the pattern of the probabilistic order level inventory system as shown in figure. Suppose that the maximum inventory level M is 11 units and the review period is 5 days. The problem is to estimate by simulation the average ending units in the inventory and number of days when a shortage condition occurs.

Expected Outcome of Experiment:

Index	Outcome
CO1	Understand the concepts of discrete event simulation and its importance in business, science, engineering, industry and other services.

Books/ Journals/ Websites referred:

1. Jerry Banks, John Carson, Barry Nelson, and David M. Nicol, "Discrete Event System Simulation"; Fifth Edition, Prentice-Hall.
 2. Averill M Law, "System Modeling & Analysis"; 4th Edition TMH.
 3. Banks C M, Sokolowski J A, "Principles of Modeling and Simulation", Wiley
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Pre Lab/ Prior Concepts:

Theory:

Objective of Simulation:

The objective is to simulate the problem. The problem is to estimate the average number of lost sales per week for an inventory system under various conditions.
Consider Daily Demand and Lead Time distribution as follows:

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Distribution of Daily Demand		
Demand	Probability	Cumulative
0	0.10	0.10
1	0.25	0.35
2	0.35	0.70
3	0.21	0.91
4	0.09	1.00

Distribution of Lead Time		
Lead Time	Probability	Cumulative
1	0.60	0.60
2	0.30	0.90
3	0.10	1.00

Characteristics Inventory System: Conceptual Model:

1. Characteristics:

- Level of inventory (M): 11 units.
- Review period (N): 5 days.
- Policy (M, N): To select M in such a way to maximize profit.
- Demand: Random.
- Lead Time: Random between 0 to 5.
- Reordering: At the beginning of 6th day.
- Shortage: Occurs when stock falls to zero.
- Cost: Cost of renting, loss due to shortage, space cost.
- System state: Represented by values of M & N.
- Entities: The inventory supervisor & Goods delivery personnel.
- Activities: Delivery of goods.
- Delay : Zero
- Order quantity = (order up to level) – (ending inventory) – (on order) + (shortage quantity)

2. Random numbers used:

- Demand
- Lead Time

Result:

Performance measures:

i) Average stock requirement = **2.6**

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ii) Average lost sales = **0.6**

Conclusion:

We have successfully conducted simulation of (M,N) Simulation system.

Post Lab Questions:

Analyze the effect of change in values of M & N on average ending inventory.

—> **Included in the attached Excel Sheet**