**ASSIGNMENT**

**233CSM-3 (Computer Modeling and Simulation)**

Last Date of submission: 0702/2023 (Tuesday)

Maximum Marks: 5 Marks

1. Name entities, attributes, activities, events, and state variables for the following systems and discuss whether the simulation should be static or dynamic, deterministic, or stochastic, continuous, or discrete.
2. **Car Showroom b) Medical Pharmacy**

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| --- | --- | --- | --- |
| Entities |  | Entities |  |
| Attributes |  | Attributes |  |
| Activities |  | Activities |  |
| Events |  | Events |  |
| State Variables |  | State Variables |  |
| Static or dynamic, deterministic, or stochastic, continuous, or discrete |  | Static or dynamic, deterministic, or stochastic, continuous, or discrete |  |

1. **The Arrival, service start time and departure times of 10 customers in a book shop are given below Complete the table and calculate the following:**
2. **service rate**
3. **arrival rate**
4. **average waiting time**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Arrival** | **Inter Arrival** | **Service start time** | **Service**  **time** | **Waiting Time** | **Departure** |
| **T1=9:00** |  | **E1=9.05** |  |  | **D1=  9:15** |
| **T2=9:10** |  | **E2=9.15** |  |  | **D2=  9:30** |
| **T3=9:25** |  | **E3= 9:30** |  |  | **D3=  9:35** |
| **T4=10:00** |  | **E4=10:00** |  |  | **D4=  10:20** |
| **T5=10:05** |  | **E5=10:20** |  |  | **D5= 10:35** |
| **T6=10:10** |  | **E6= 10:35** |  |  | **D6=  10:45** |
| **T7=10:15** |  | **E7=10:45** |  |  | **D7=  10:52** |
| **T8=10:24** |  | **E8= 10:55** |  |  | **D8=  10: 59** |
| **T9=10:36** |  | **E9=11:00** |  |  | **D9=  11:20** |
| **T10=10:38** |  | **E10=11:20** |  |  | **D10= 11:30** |

3. In a coffee shop the cashier can serve 30 customers, on the average each hour. The customers arrive at the shop every 12 minutes, on the average. Find the following:

(i) Average waiting time in the system

(ii) Average waiting time of a customer in queue

(iii) Average number of employees in the system

(iv) Average number of employees in the queue

4. A supplier sells Hipoint-brand markers to stationary shops. The annual demand is approximately 30000 pens. The supplier pays SR 3 for each pen and estimates that the annual holding cost is 15 percent of the pen's value. It costs approximately SR 600 to place an order. The supplier currently buys 10000 pens per order

i. Determine the annual ordering and inventory cost (in SR) for current order quantity.

ii. Determine the economic order quantity (EOQ).

iii. Determine the total annual cost for the EOQ

5. An automobile shop sells 600 batteries in a year and the sales is relatively constant

throughout the year. These batteries are purchased for SR 300 each, and the lead time is 5 days. The annual holding cost per battery is 10 % of the unit cost and the ordering cost per order is SR 250. There are 25 working days per month. Calculate the following:

(i) What is the annual holding cost?

(ii) In minimizing the cost, how many orders would be made each year?

(iii) Given the EOQ, what is the total annual inventory cost (including purchase cost)?

(iv) What is the time between orders?

(v) What is the ROP?

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