



(v) Let n_j denote the total arrival rate of customers to the station s_j . Then the traffic flow equation is

$$\lambda_j = r_j + \sum_{i=1}^m \lambda_i p_{ij}$$

Procedure:

- 1. Average number of customers in the system S_j is $L_{S_j} = \frac{\lambda_j}{\lambda_j \mu_j}$
- 2. Average number of customers in the overall system $L_S = \sum_{j=1}^k L_{S_j}$
- 3. Average waiting time in the system $W_S = \frac{L_S}{r_1 + r_2 + \dots + r_k}$

Experiment:

Program

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arr time=float(input("Enter the mean inter arrival time of objects from Feeder (in
secs):
"))
ser_time1=float(input("Enter the mean inter service time of Lathe Machine 1 (in
secs):
"))
ser_time2=float(input("Enter the mean inter service time of Lathe Machine 2 (in
secs):
ser_time3=float(input("Enter the mean inter service time of Lathe Machine 3 (in
secs):
"))
Robot_time=float(input("Enter the Additional time taken for the Robot (in secs) :
"))
lam=1/arr_time
mu1=1/(ser_time1+Robot_time)
mu2=1/(ser_time2+Robot_time)
mu3=1/(ser_time3+Robot_time)
print("-----")
print("Series Queues with infinite capacity- Open Jackson Network")
print("-----")
if (lam < mu1) and (lam < mu2) and (lam < mu3):
Ls1=lam/(mu1-lam)
Ls2=lam/(mu2-lam)
Ls3=lam/(mu3-lam)
| <=| <1+| <2+| <3
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__ ___.__.
Lq1=Ls1-lam/mu1
Lq2=Ls2-lam/mu2
Lq3=Ls3-lam/mu3
Wq1=Lq1/lam
Wq2=Lq2/lam
Wq3=Lq3/lam
Ws=Ls/(3*lam)
print("Average number of objects in the system S1 : %0.2f "%Ls1)
print("Average number of objects in the system S2 : %0.2f "%Ls2)
print("Average number of objects in the system S3 : %0.2f "%Ls3)
print("Average number of objects in the overall system : %0.2f "%Ls)
print("Average number of objects in the conveyor S1: %0.2f "%Lq1)
print("Average number of objects in the conveyor S2: %0.2f "%Lq2)
print("Average number of objects in the conveyor S3: %0.2f "%Lq3)
print("Average waiting time of an object in the conveyor S1: %0.2f secs" Wq1)
print("Average waiting time of an object in the conveyor S2: %0.2f secs" WWq2)
print("Average waiting time of an object in the conveyor S3 : %0.2f secs"%Wq3)
else:
print("Warning! Objects Over flow will happen in the conveyor")
print("-----")
```

Output

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Enter the mean inter arrival time of objects from Feeder (in secs): 12
Enter the mean inter service time of Lathe Machine 1 (in secs): 1
Enter the mean inter service time of Lathe Machine 2 (in secs): 1.5
Enter the mean inter service time of Lathe Machine 3 (in secs): 1.3
Enter the Additional time taken for the Robot (in secs): 7
Series Queues with infinite capacity- Open Jackson Network
Average number of objects in the system S1 : 2.00
Average number of objects in the system S2 : 2.43
Average number of objects in the system S3 : 2.24
Average number of objects in the overall system : 6.67
Average number of objects in the conveyor S1 : 1.33
Average number of objects in the conveyor S2 : 1.72
Average number of objects in the conveyor S3 : 1.55
Average waiting time of an object in the conveyor S1: 16.00 secs
Average waiting time of an object in the conveyor S2: 20.64 secs
Average waiting time of an object in the conveyor S3 : 18.62 secs
```

Result

The average number of material in the system and in the conveyor and waiting time are successfully found.

Releases

No releases published

Packages

No packages published

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