

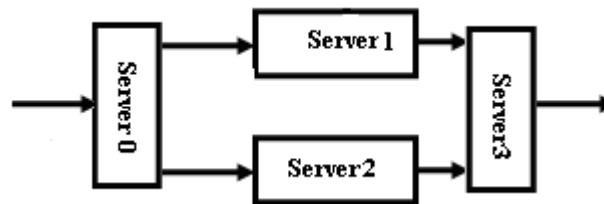


1. **Discrete Simulation:**

Objective: This part aims to test the ability of students to use discrete simulation method of solution for any type of problem that includes single or multi server(s) and single or multi queue(s). In addition students must display the behavior of a simulation system through the time analysis/time table and show the proposal decision.

Q1/(12 marks)

Assume that we have the following system network which includes three layers.



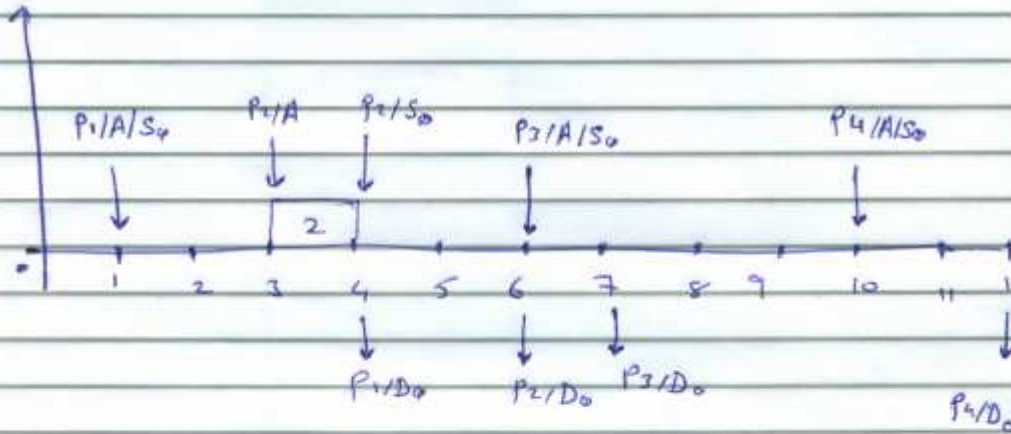
Perform Next Event Scheduling (NES) simulation technique on the following discrete model:

Process No.	Inter-arrival Time	Service Time for servers 0 and 2	Service Time for servers 1 and 3
1	1	3	2
2	2	2	1
3	3	1	3
4	4	2	1

Answer the following requirements (3-marks for each):

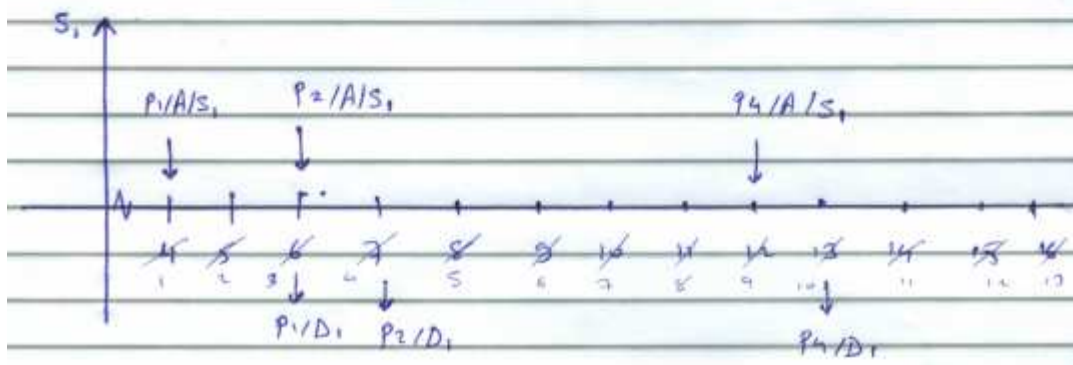
- 1- Find *time analysis*, for each layer with optimal selection to speedup calculation..
- 2- Find utilizations and total waiting time for each layer.
- 3- Draw your conclusion for each layer.

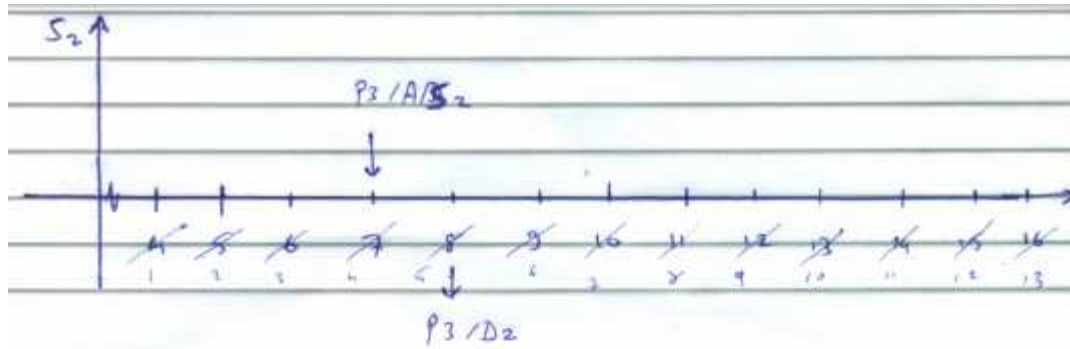
30



$$f = \frac{\sum s_i}{1T} = \frac{8}{10} = 0.8$$

We have enough number of server





(2)

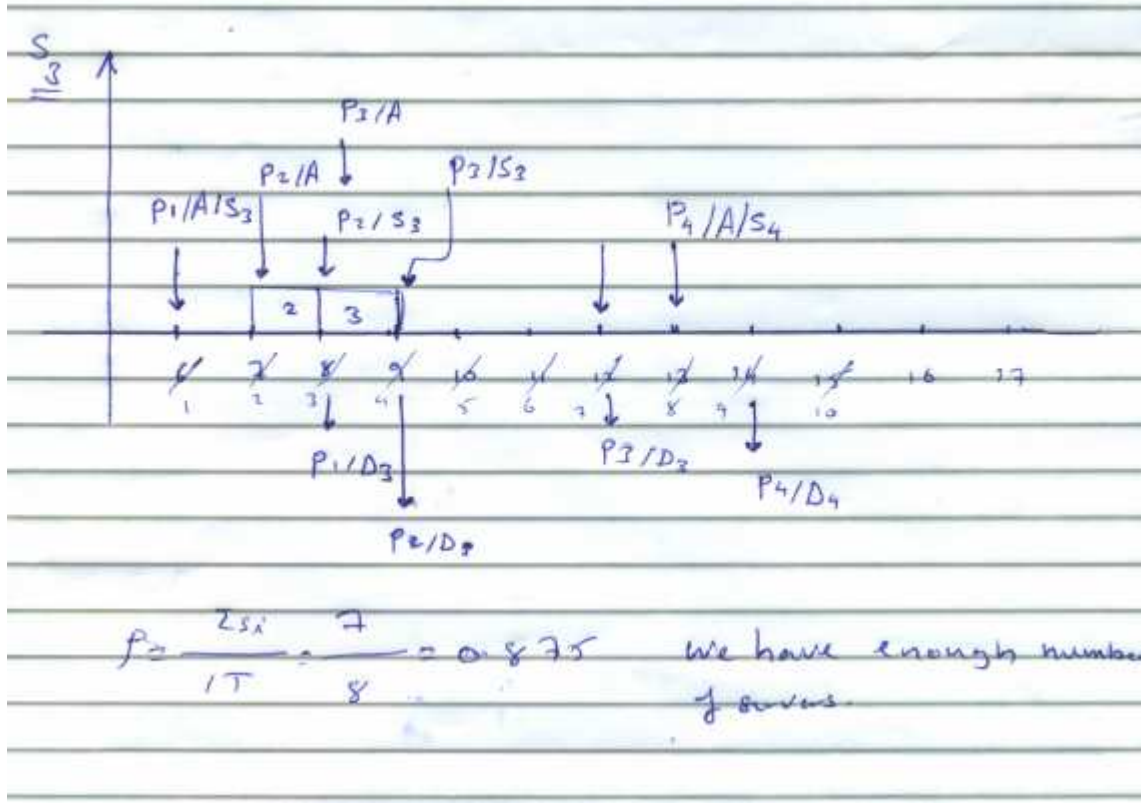
net profile of service time



$$\sum s_i = 5$$

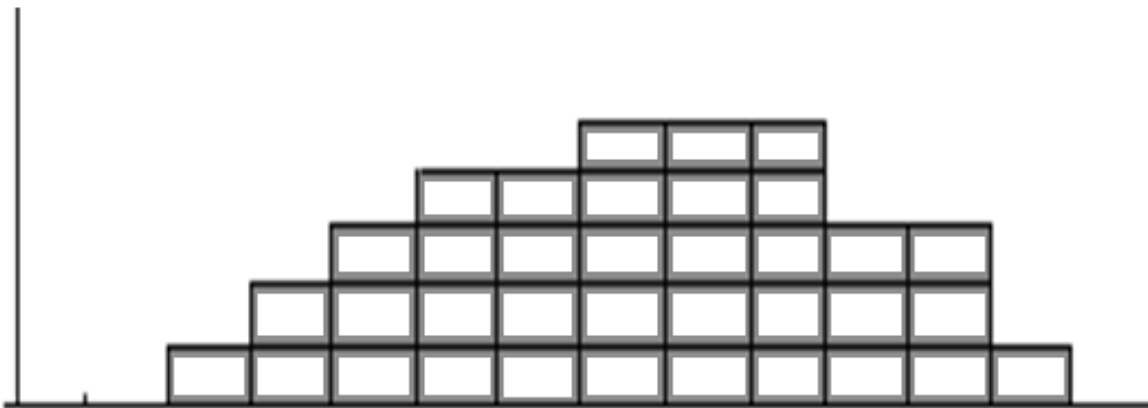
$$\rho = \frac{\sum s_i}{IT} = \frac{5}{9} = 0.55$$

it needs to
reduce number of
servers



Q2(8marks)

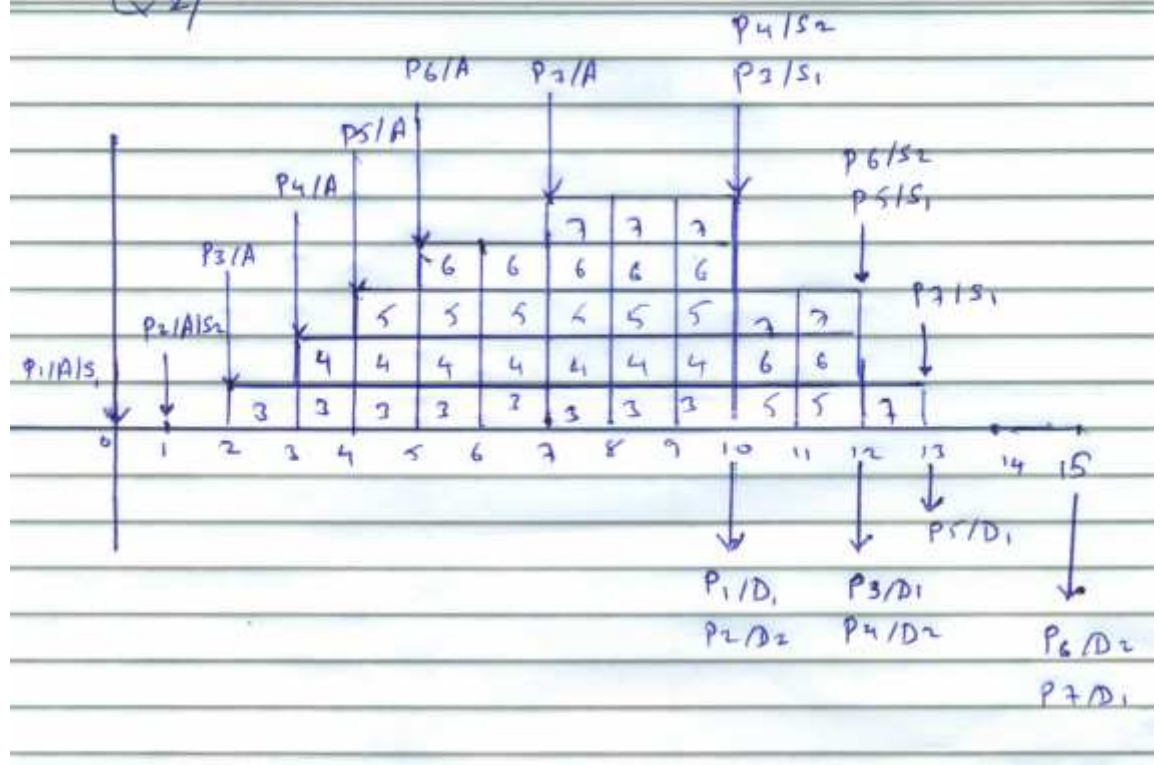
Assume that we have the following system analysis:



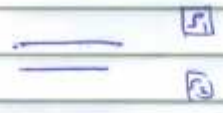
- Find discrete model that includes (process number, Interarrival time, service time) from the above system analysis using NES.
- Show the number of server(s) and queue(s) which are used to produce the above analysis.

(3)

Q 2/



Using one queue and two servers.



#P	Arr	Int. Arr	Service
1	0	0	10
2	1	1	9
3	2	1	2
4	3	1	2
5	4	1	1
6	5	1	2
7	7	2	2