Job sequencing

An order is to be observed in all things

The selection of an appropriate order for a series of jobs to be done on a finite number of service facilities, in some pre assigned order is

	J_1	J_2	J_3	J_4	J_5	J_6
Turning	2	3	4	8	7	4
Threading	1	5	2	9	5	8

number of machines
Processing order
Processing time
Total elapsed time
idle time on a machine
No passing rule

Optimum Sequence Algorithm (Johnson's Algorithm)

	J_1	J_2	- - -	J_n
M_1	t_{11}	t_{12}		t_{1n}
M_2	t_{21}	t_{22}	- - -	t_{2n}

Step 1st:- List the jobs along with their processing times in a table as shown above

Step 2nd:- Examine the column & find out ~~the~~ smallest processing time

Step 3rd:- If the smallest processing time is for the first machine M_1, then place the corresponding job in the first available position.

Step 4th:- If the smallest processing time is for the second machine M_2, then place the corresponding job in the last available position.

Step 5th:- If there is a tie, then three cases arises

(a) if $t_{1K} = t_{2r}$
then process the K^{th} job first & r^{th} job last

(b) if $t_{1K} = t_{1r}$ (Machine M_1)
then select arbitrarily any job first that have maximum time on machine M_2

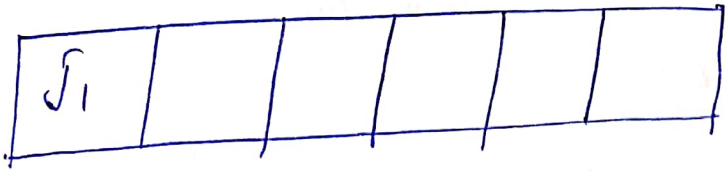
(c) if $t_{2K} = t_{2r}$ (Machine M_2)
then select arbitrarily any job last that have maximum time on machine M_1

Q In a factory, there are six jobs to perform each of which should go through two machines A and B, in the order A, B. The processing timings (in hours) for the jobs are given here. You are required to determine the sequencing for performing jobs that ~~should~~ would minimize the total elapsed time T. What is the value of T?

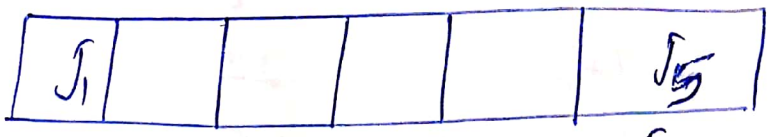
Job	J_1	J_2	J_3	J_4	J_5	J_6
A	1	3	8	5	6	3
B	5	6	3	2	2	10

Soln

Job	J_1	J_2	J_3	J_4	J_5	J_6
Machine A	(1)	3	8	5	6	3
Machine B	5	6	3	2	2	10



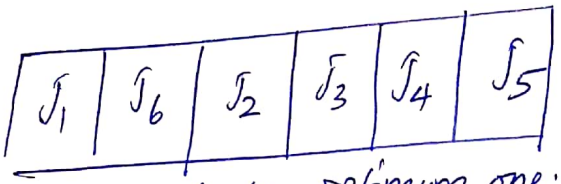
Job	J_2	J_3	J_4	J_5	J_6
A	3	8	5	6	3
B	6	3	(2)	(2)	10



Job	J_2	J_3	J_4	J_6
A	3	8	5	3
B	6	3	(2)	10

Job	J_2	J_3	J_6
A	(3)	8	(3)
B	6	(3)	10

Job	J_2	J_3
A	(3)	8
B	6	(3)



This sequence is the optimum one. The total elapsed time is calculated by

Job	Machine A time in	Machine A time out	Machine B time in	Machine B time out	idle time on B
J_1	0	1	1	6	1
J_6	1	4	6	16	
J_2	4	7	16	22	
J_3	7	15	22	25	
J_4	15	20	25	27	
J_5	20	26	27	29	

Total elapsed time = 29 hours.

Idle time on A = 0 + 3 = 3 hours

Idle time on B = 1 hours.