Assignment No 3

1) Find the sequence that minimize Elapsed time required to complete the following tasks on Two Machine?

Task	I	II	III	IV	V	VI	VII	VIII	IX
Machine A	4	10	8	18	12	16	14	10	8
Machin B	12	16	14	8	6	18	6	16	22

→ Step ①

Tasks	Machine A	machine B
I	4	12
II	10	16
III	8	14
IV	18	8
V	12	6
VI	16	18
VII	14	6
VIII	10	16
IX	8	12

- Select the least processing time occur in mic A & mic Colum
- If the least processing time is A2 then select 2th job first
- If Bs then ~~selt~~ Select 5th job first
- Here, least processing time is 4 which is a machin A

∴ Keep Job I to LHS and Ti least processing time on machine 3 then keep that Job on RHS

A I III IX II VIII VI IV VII V B

Job	machine A		machine B	
	intime	outtime	Intime	outtime.
I	0	4	4	16
II	4	12	16	30
IX	12	20	30	52
II	20	30	52	68
VIII	30	40	68	84
VI	40	51	84	102
IV	51	74	102	110
VII	74	88	110	116
V	88	100	116	122.

Total elapsed time = 122 hr

Total idle time = 4 hr

Idle time for A = 22 hr

Q2 A book binder has one printing press. one binding machine & manuscripts of seven difference book. The time require for performing printing and binding operation for different book are given below:

Books	1	2	3	4	5	6	7
Printing time (hr)	20	90	80	20	120	15	65
Binding time (hr)	25	60	75	30	90	35	50.

→ Step ①

Books	printing time (hr)	Binding time (hr)
1	20	25
2	90	60
3	80	75
4	20	30
5	120	90
6	15	35
7	65	50.

- Select the least processing time occur in printing time & Binding time column
- In the least processing time B then select nth job first
- If the B1 then select 5th job first.
- Here least processing time is 15 which printing time
∴ keep job 6 to out side and Is least processing time is Binding time then keep that job at Rsts.

A C 1 4 5 3 2 7 B

Books	Printing time (hr)		Binding time (hr)	
	Intime	out time	Intime	outime.
6	0	15	15	50
1	15	35	50	75
4	35	55	75	105
5	55	175	175	265
3	175	255	265	340
2	255	345	345	405
7	345	410	410	460.

Total elapsed time = 460 hr

Idle time 95 hr

Idle time for A = 50 hr.

Q3 Find the sequence that manimizes the total elapsed time required to complate the following task.

Task	1	2	3	4	5
Machine A	5	7	6	9	5
machine B	2	1	4	5	3
machine C	3	7	5	6	7

→ Step ①

Tasks	machine A	D	C
1	5	2	3
2	7	1	7
3	6	1	7
4	9	5	7
5	5	3	7

minimum time for A = 3

maximum time for B = 5

minimum time for C = 3

ⓐ minimum time for A ≥ maximum time for B.

Condition ⓐ is satisfy then cannot the given problem into two mic problemn

i.e G = A+B

& H = B+C

Task	machine	
	G	H
1	7	5
2	8	8
3	10	9
4	14	11
5	8	10

G 2 5 4 3 1 H

Task	A		B		C	
	Intime	outtime	intime	outtime	Intime	outtime.
2	0	7	7	8	8	15
5	7	12	12	15	15	22
4	12	21	21	26	26	32
3	21	27	27	31	32	37
1	27	32	32	34	37	40.

Total elapsed time time = 40 hr

Total Idle time = 12 hr.

Q 4) Determine the optimal ~~opti~~ sequence of performing 5 Jobs 4 machine that minimizes total elapsed time. The machine or each job is required in the order ABCD and processing timing in hrs are show follows.

Job	M_1	M_2	M_3	M_4
J_1	24	9	12	21
J_2	27	6	15	15
J_3	18	12	15	24
J_4	36	15	3	27
J_5	21	3	6	9.

Find ① Total elapsed time ② idle time

→ Steps ①

$\text{Min}(M_1) = 18$

$\text{Max}(M_2, M_3) = (15, 15) = 15$

$\text{Min}(M_4) = 9$

here

ⓐ $\text{min}(M_1) \geq \text{Max}(M_2, M_3)$

The Condition (a) is satisfy now check the Constant for each Job

for J_1 $M_2, M_3 = 9 + 12 = 21$

for J_2 $= M_2 + M_3 = 6 + 15 = 21$

for J_3 $= M_2 + M_3 = 12 + 15 = 27$

for J_4 $= M_2 + M_3 = 15 + 3 = 18.$

here : $M_2 + M_3 \neq C$

Step ② :- we define two machine G & H such that

$G = M_1 + M_2 + M_3$

$H = M_2 + M_3 + M_4$

Job	G	H
J1	45	42
J2	48	36
J3	45	51
J4	54	45
J5	30	18

optimal sequence is

G: J1 J2 J3 J4 J5 H

Job	M1		M2		M3		M4	
	In	out	in	out	in	out	in	out
J1	0	24	24	33	33	45	45	66
J2	24	42	42	54	54	69	69	93
J3	42	78	78	93	93	96	96	123
J4	78	105	105	111	111	126	126	141
J5	105	126	126	129	129	135	141	150.

Total elapsed time = 150 hr

Idle time for M1 = 24 hr

Idle time for M2 = 24+9+24+12+15+21 = 105 hr.

Idle time for M3 = 33+9+24+15+3+15 = 99 hr.

Idle time for M4 = 45+3+3+3+0 = 54 hr.

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