QUESTION:

https://www.chegg.com/homework-help/questions-and-answers/problem-2-10-points-consider-following-job-scheduling-problem-one-machine-set-n-jobs-1-2---q94999480

Expert Answer Below:

ANSWER:

a)

Optimal sequence is determined using Johnson's rule as below

Select the job with the shortest processing time, if that is for Operation 1 (m/c 1), then schedule the job first, if that is for Operation 2 (m/c 2), then schedule the job last. Remove the jobs which are scheduled from further consideration Repeat the process until all jobs are scheduled

Select the job with the shortest processing time, if that is for Operation 1 (m/c 1), then schedule the job first, if that is for Operation 2 (m/c 2), then schedule the job last. Remove the jobs which are scheduled from further consideration. Repeat the process until all jobs are scheduled.

Step 1

			Flowtime	
Job	m/c 1	m/c 2	m/c 1	m/c 2
1	4	6	4	10
2	2	4	6	14
3	5	1	11	15
4	3	5	14	20
5	4	3	18	23

Step 2

			Flowtime	
Job	m/c 1	m/c 2	m/c 1	m/c 2
1	4	6	4	10
2	2	4	6	14
4	3	5	9	19
5	4	3	13	22
3	5	1	18	23

Step 3

			Flowtime	
Job	m/c 1	m/c 2	m/c 1	m/c 2
2	2	4	2	6
1	4	6	6	12
4	3	5	9	17
5	4	3	13	20
3	5	1	18	21

Step 4

			Flowtime	
Job	m/c 1	m/c 2	m/c 1	m/c 2
2	2	4	2	6
4	3	5	5	11
1	4	6	9	17
5	4	3	13	20
3	5	1	18	21

Step 5

Final Schedule

			Flowtime	
Job	m/c 1	m/c 2	m/c 1	m/c 2
2	2	4	2	6
4	3	5	5	11
1	4	6	9	17
5	4	3	13	20
3	5	1	18	21

Optimal schedule is:

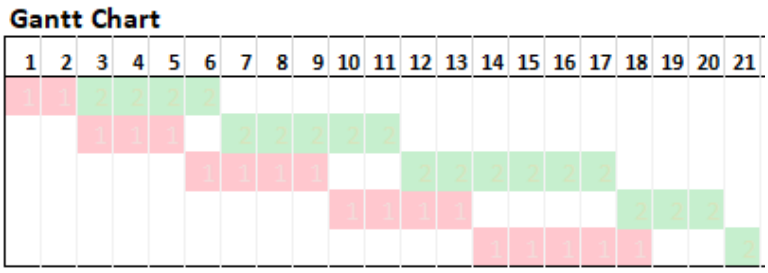
Sequence Order	Job
1	2
2	4
3	1

4	5
5	3

Makespan value = 21

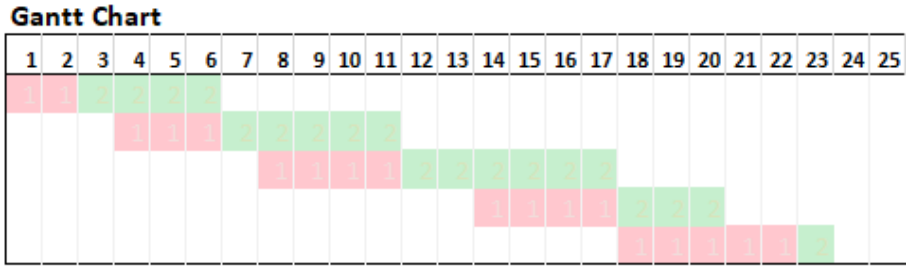
Gantt Chart is following:

	m/c 1		m/c 2	
Job	In	Out	In	Out
2	0	2	2	6
4	2	5	6	11
1	5	9	11	17
5	9	13	17	20
3	13	18	20	21



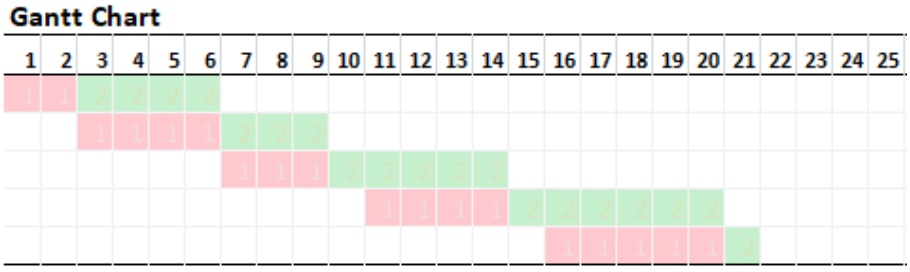
b) Gantt chart for no-wait schedule is following:

	m/c 1		m/c 2	
Job	In	Out	In	Out
2	0	2	2	6
4	3	6	6	11
1	7	11	11	17
5	13	17	17	20
3	17	22	22	23



c) The optimum no-wait schedule is obtained by rescheduling the tasks, except the first and the last, in ascending order of their processing time on m/c 2. Resulting Gantt chart is following:

	m/c 1		m/c 2	
Job	In	Out	In	Out
2	0	2	2	6
5	2	6	6	9
4	6	9	9	14
1	10	14	14	20
3	15	20	20	21



d) The sufficient condition, under which the optimal schedule of 2-machine flow shop scheduling problem is always optimal to the no-wait problem, if their processing times on the second operation are in ascending order.