

* Job sequencing using with deadlines :-

- The sequencing of jobs on a single processor with deadline constraints is called as Job sequencing with Deadlines.

- Here you are given a set of jobs
- Each job has a defined deadlines and some profit associated with its deadline.
- Only one processor is available for processing all the jobs.
- Processor takes one unit of time to complete a job.
- No preemption is allowed.

* Algorithm :-

- Greedy Algorithm is adopted to determine how next job is selected for an optimal solution

Step 1 :- Sort all the given jobs in decreasing order of their profit.

Step 2 :-

- Check the value of maximum deadline
- Put the job on Gantt chart as far as possible from 0 ensuring that the job gets completed before its deadlines.
- Draw a Gantt chart where maximum time on Gantt chart is value of maximum deadlines.

Step 3 :-

- Pick up the jobs one by one.
- Put the job on Gantt chart as far as possible from 0 ensuring that the job gets completed before its deadlines.

* Problem :-

Given the jobs, their deadlines and associated profit as shown.

Jobs	J ₁	J ₂	J ₃	J ₄	J ₅	J ₆
Deadlines	5	3	3	2	4	2
Profit	200	180	190	300	120	100

Answer the following questions :-

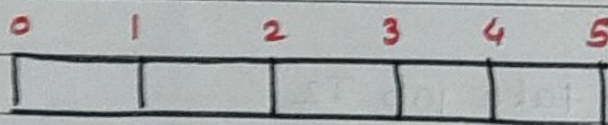
1. Write optimal schedule that gives maximum profit?
2. Are all jobs completed in the optimal schedule?
3. What is the maximum earned profit?

Soln →

Step 1 :- Sort all the given jobs in decreasing order of their profit.

Jobs	J ₄	J ₁	J ₃	J ₂	J ₅	J ₆
Deadlines	2	5	3	3	4	2
Profit	300	200	190	180	120	100

Step 2 :- maximum value of deadline = 5

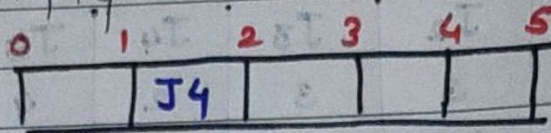


So draw a ~~Gantt~~ Gantt chart with maximum time on Gantt chart = 5 units as shown above. Now,

- We take each job one by one in the order they appear in step 1.
- We place the job on the Gantt chart as far as possible from 0

Step 3:-

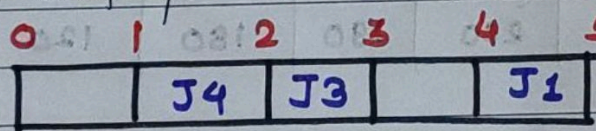
- We take job J4
- Since its deadline is 2, so we place it in the first empty cell before deadline 2 as

Step 4:-

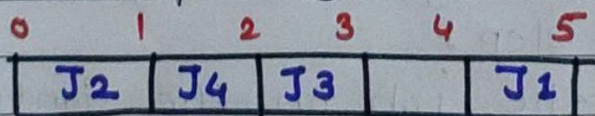
- We take job J1
- Since its deadline is 5, so we place it in the first empty cell before deadline 5 as:-

Step 5:-

- We take job J3
- Since its deadline is 3, so we place it in the first empty cell before deadline 3 as

Step 6:-

- We take job J2
- Since its deadline is 3, so we place it in the first empty cell before deadline 3.
- Since the second and third cells are already filled, so we place job J2 in the first cell as.



Step 7:-

- Now we take job J5.
- Since its deadline is 4, so we place it in the first empty cell before deadline 4 as.

0	1	2	3	4	5
J2	J4	J3	J5	J1	

Now,

- The only job left is job J6 whose deadline is 2.
- All the slots before deadline 2 are already occupied.
- Thus, job J6 can not be completed.

Part 1:-

The optimal schedule is

J2 - J4 - J3 - J5 - J1

This is the required order in which the jobs must be completed in order to obtain the maximum profit.

Part 2:-

- All the jobs are not completed in optimal schedule.
- This is because job J6 could not be completed within its deadline.

Part 3:-

Maximum earned profit

= Sum of profit of all the jobs in optimal schedule

= Profit of J2 + Profit of J4 + Profit of job J3 + profit of Job J5 + Profit of job J1

= 180 + 300 + 190 + 120 + 200

= 990 units