https://www.chegg.com/homework-help/questions-and-answers/given-array-jobs-every-job-deadline-associated-profit-job-finished-deadline-also-given-eve-q67106293

Given An Array Of Jobs Where Every Job Has A Deadline And Associated Profit If The Job Is Finished Before The Deadline. It Is Also Given That Every Job Takes A Single Unit Of Time, So The Minimum Possible

Given an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes a single unit of time, so the minimum possible deadline for any job is 1. The job sequencing problem is to maximize total profit if only one job can be scheduled at a time. Below is an example output for the optimal solution to this problem.

Input: Five Jobs with the following deadlines and profits

JobID	*Deadline*	*Profit*
a	*2*	*100*
b	*1*	*19*
c	*2*	*27*
d	*1*	*25*
e	*3*	*15*

Output: Following is the maximum profit sequence of jobs c, a, e

(a) Describe, in words, a greedy algorithm for the job sequencing problem.

(b) Prove that your greedy choice is optimal (e.g. proof by contradiction).

Greedy algorithm for the job sequencing problem:-

Step-01:

Sort all the given jobs in decreasing order of their profit.

Step-02:

Check the value of maximum deadline.

Draw a Gantt chart where maximum time on Gantt chart is the value of maximum deadline.

Step-03:

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 deadline.

2.)We can prove it bye taking

Two components:

1.) Optimal substructure

2.) Greedy Choice Property: There exists an optimal solution that is consistent with the greedy choice made in the first step of the algorithm.

Greedy Choice Property

1. Let Sk be nonempty subproblem containing the set of activities that finish after activity ak.

2. Let am be an activity in Sk with the earliest finish time.

3. Then am is included in some maximum-size subset of mutually compatible activities of Sk.

Proof

• Let Ak be a maximum-size subset of mutually compatible activities in Sk,

• let aj be the activity in Ak with the earliest finish time.

• If aj = am, we are done, since we have shown that am is in some maximumsize subset of mutually compatible activities of Sk.

• If aj 6= am, let the set A0 k = Ak − {aj} ∪ {am}

• The activities in A0 k are disjoint, because – the activities in Ak are disjoint, – aj is the first activity in Ak to finish, – fm ≤ fj.

• Since |A0 k | = |Ak|, we conclude that A0 k is a maximum-size subset of mutually compatible activities of Sk, and it includes am.