Design and Analysis of Algorithms

TAE - 3 Set - 6

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Set - 6

Q. 1. Solve the following:

A.

Soln. Given,

Activity	A_1	A_2	A_3	A_4	A_5	A_6
Start	0	3	1	5	5	8
Finish	6	4	2	9	7	9

Step 1: Sort activities in ascending order a/c to their finish time.

Activity	A_3	A_2	A_1	A_5	A_4	A_6
Start	1	3	0	5	5	8
Finish	2	4	6	7	9	9

Step 2: Select first activity ⇒ selected = [A3]

Step 3: For remaining:

is the start time >= past selected activity's end time,
selected it
else leave it.

∵ A2's start time >= A3's finish time
⇒ selected = [A3, A2]

A1's start time is not greater than A2's finish
∴ Leave it

A5's start time >= A2's finish time
⇒ Selected = [A3, A2, A5]

A4's start time is less than A5's finish time.
∴ Leave it.

A6's start time >= A5's finish time.
⇒ Selected = [A3, A2, A5, A6]

Therefore, maximum 4 activities can be scheduled.

Q. 1. B.

Soln.

Objects	1	2	3	4	5	6	7
Profits	10	5	15	7	6	18	3
Weights	2	3	5	7	1	4	1
Profit/wt.	5	1.66	3	1	6	4.5	3

Max. capacity of knapsack = 15

Step 1:
Sort objects w.r.t. Profit / weight ratio

Objects	5	1	6	3	7	2	4
Profits	6	10	18	15	3	5	7
Weights	1	2	4	5	1	3	7
P/w	6	5	4.5	3	3	1.66	1

Step 2: Take objects with max P/w ratio until there's no more space left.

⇒ Take object 5,
Net profit = 6, Remaining capacity = 15 - 1

⇒ Take object 1
Net profit = 6 + 10, Remaining capacity = 14 - 2

⇒ Take object 6
Net profit = 16 + 18, Rem. capacity = 12 - 4 = 8

⇒ Take object 3
Net profit = 34 + 15, Rem. capacity = 8 - 5 = 3

⇒ Take object 7,
Net profit = 49 + 3, Rem capacity = 3 - 1 = 2

⇒ Take object 2,
Net profit = $52 + \frac{2}{3} \times 5$, Rem. capacity = $2 - \frac{2}{3} \times 3$

⇒ Remaining capacity = 0
∴ Net Profit = $52 + \frac{10}{3} = 55.33$

Total objects = [5, 1, 6, 3, 7, 2/3, 2]