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Ans to the Ques no 1

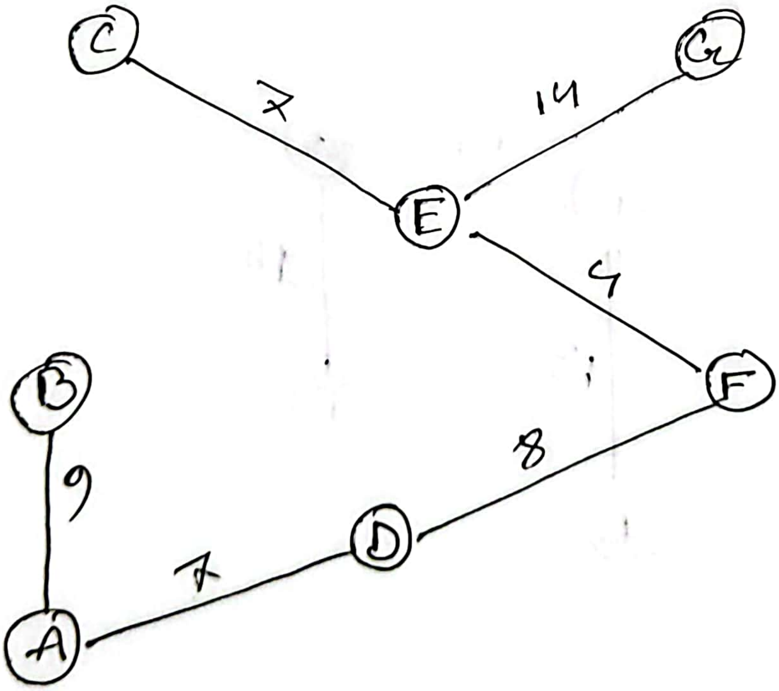
(Graph 1)

a) Here I would like to apply Kruskal Algorithm to minimize the electricity consumption.

edges in the graph

CE(7), EG(14), CB(10), BE(9), EF(4), GF(15), ED(13), BD(11), DF(8), BA(9), AD(7)

Sorted edges: ~~EF(4)~~, ~~AD(7)~~, ~~CE(7)~~, ~~DF(8)~~, ~~[illegible]~~ ~~BA(9)~~, BE(9), CB(10), BD(11), ED(13), ~~EG(14)~~, GF(15)



Total consumption => 7+14+4+8+7+9 => 49

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b) Summation of total cost of edges:

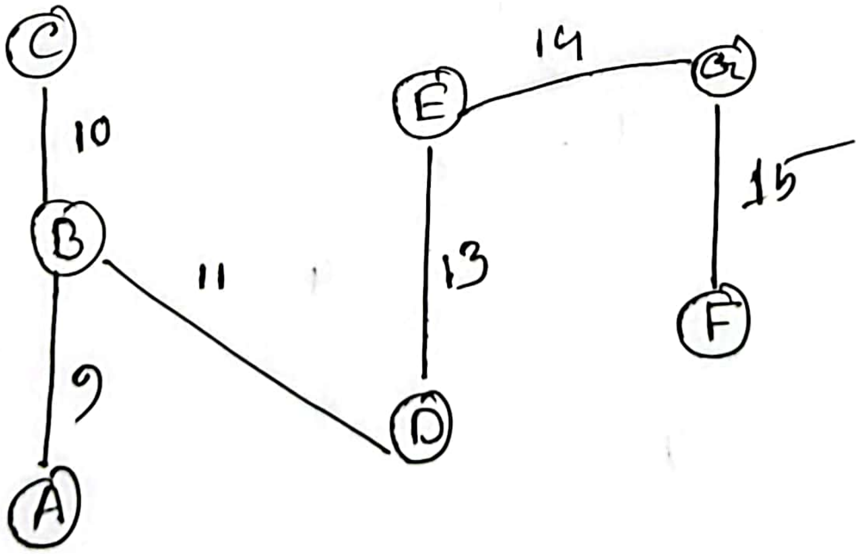
7+14+10+9+4+15+11+13+8+9+7 => 107

After, applying Kruskal Algo the cost is 49 so, the maximum electricity can be save (107-49) = 58

Ans

c) If we sort the array in descending order we can get the graph of maximum consumption

Descending order sort: GF(15), EG(14), ED(13), BD(11), CB(10), BE(9), BA(9), DF(8), ~~CD(7)~~ CE(7), AD(7) EF(4)

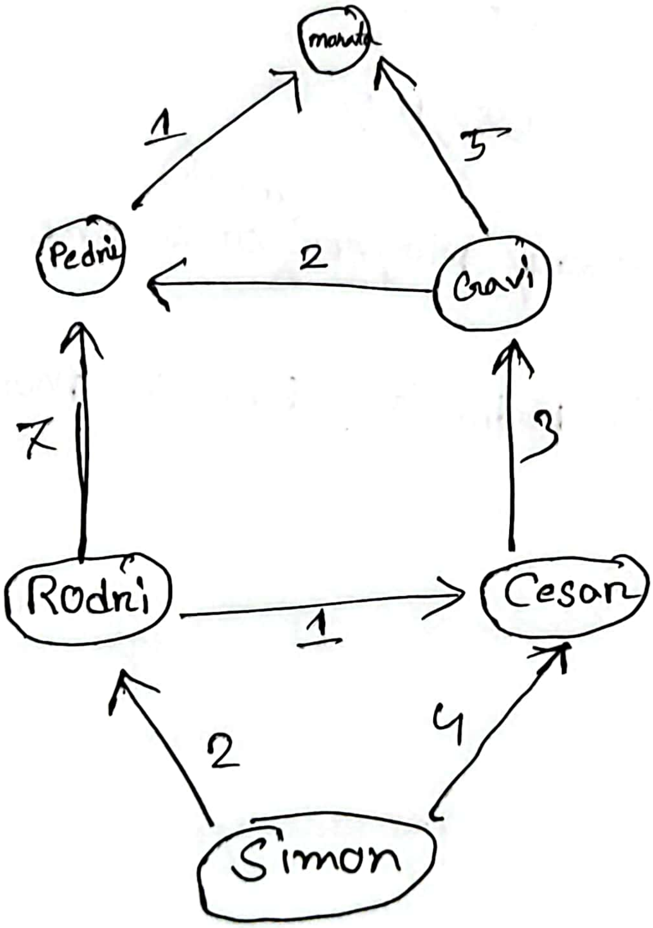


Total cost: 72

Ans to the Ques no 2

Graph 2

a) By Applying Dijkstra Algorithm we can know the lowest cost from source to every other nodes.



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[V]	[d]
Source ↖ Simon	0
2. Rodri	~~∞~~ 2
3. Cesar	~~∞~~ ~~4~~ 3
5. Pedri	~~∞~~ ~~9~~ 8
9. Gavi	~~∞~~ 6
Monata	~~∞~~ ~~11~~ 9

From simon to every player, (lowest) cast are given below,

. Rodri(2), Cesar(3), Pedri (8), Gavi (6), Monata (9)

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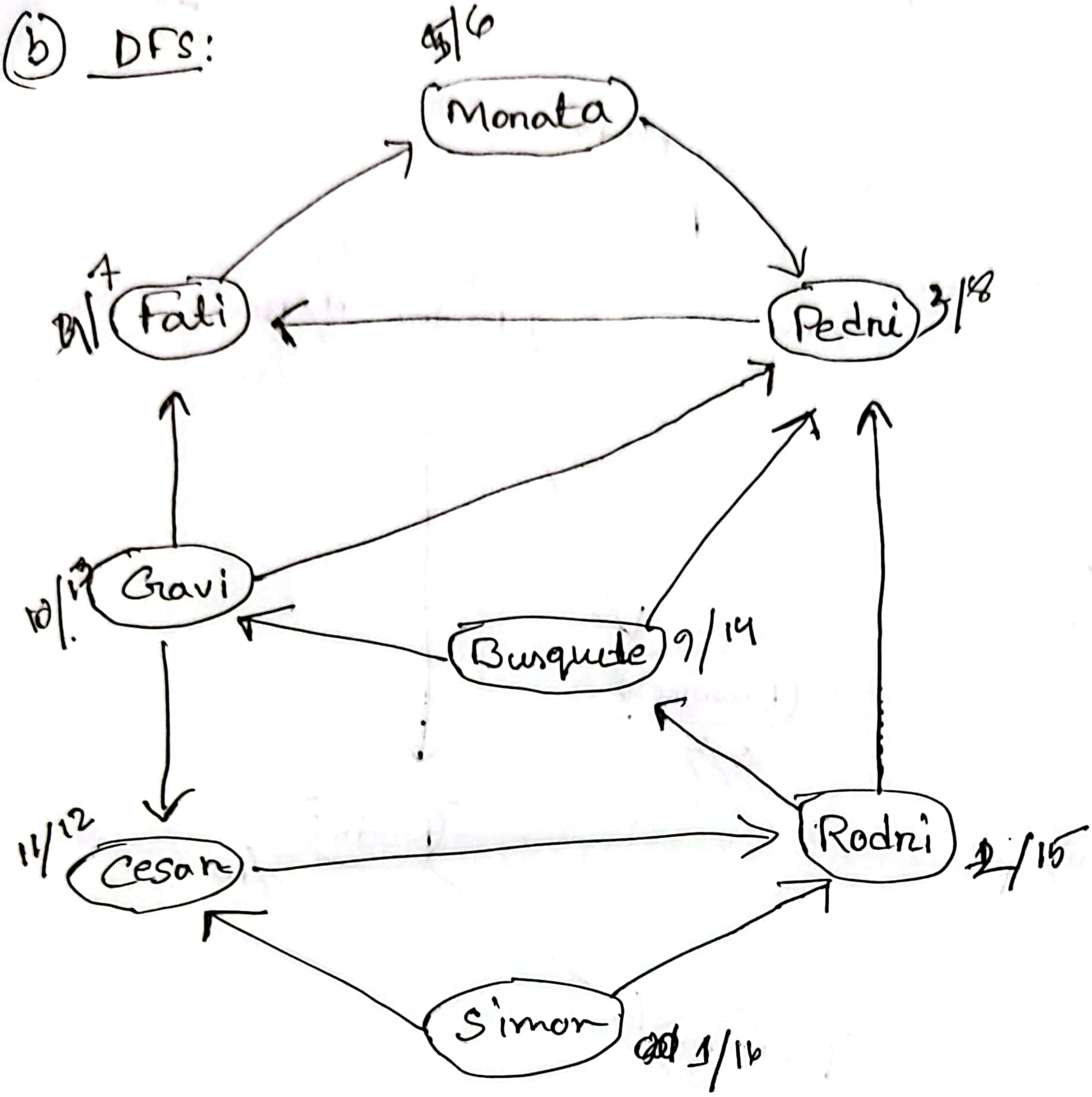
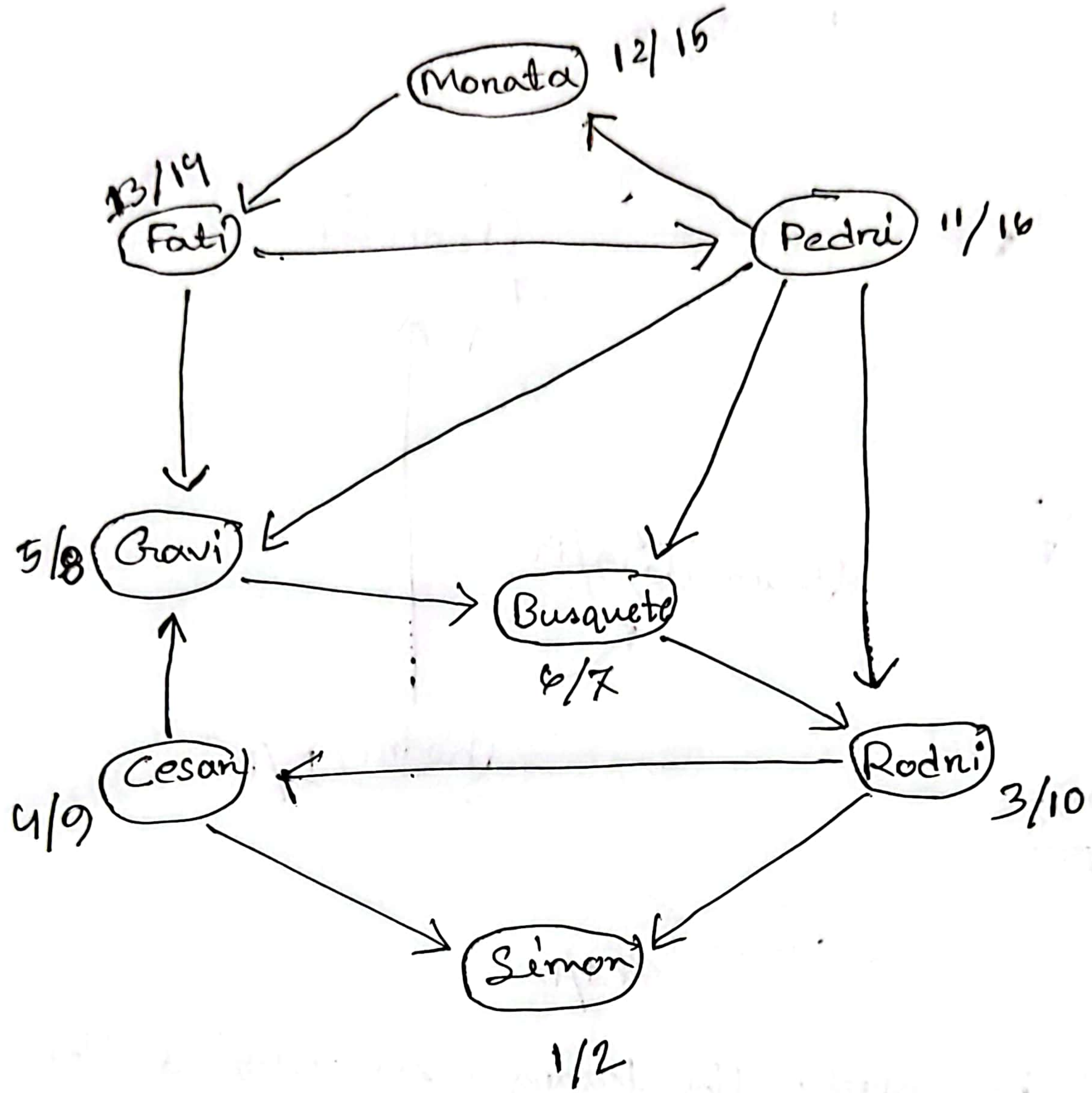
(b) DFS:



We will now apply the kosaraju Algo to find the strongest connected components to figure out the largest group of players.

Reversed edge DFS



SCC1: Simon

SCC2: Rodni, Cesar, Gravi, Busquete

SCC3: Monata, Fati, Pedri

From here, we can see ~~that~~ the largest group is (Rodni, Cesar, Gravi, Busquete)

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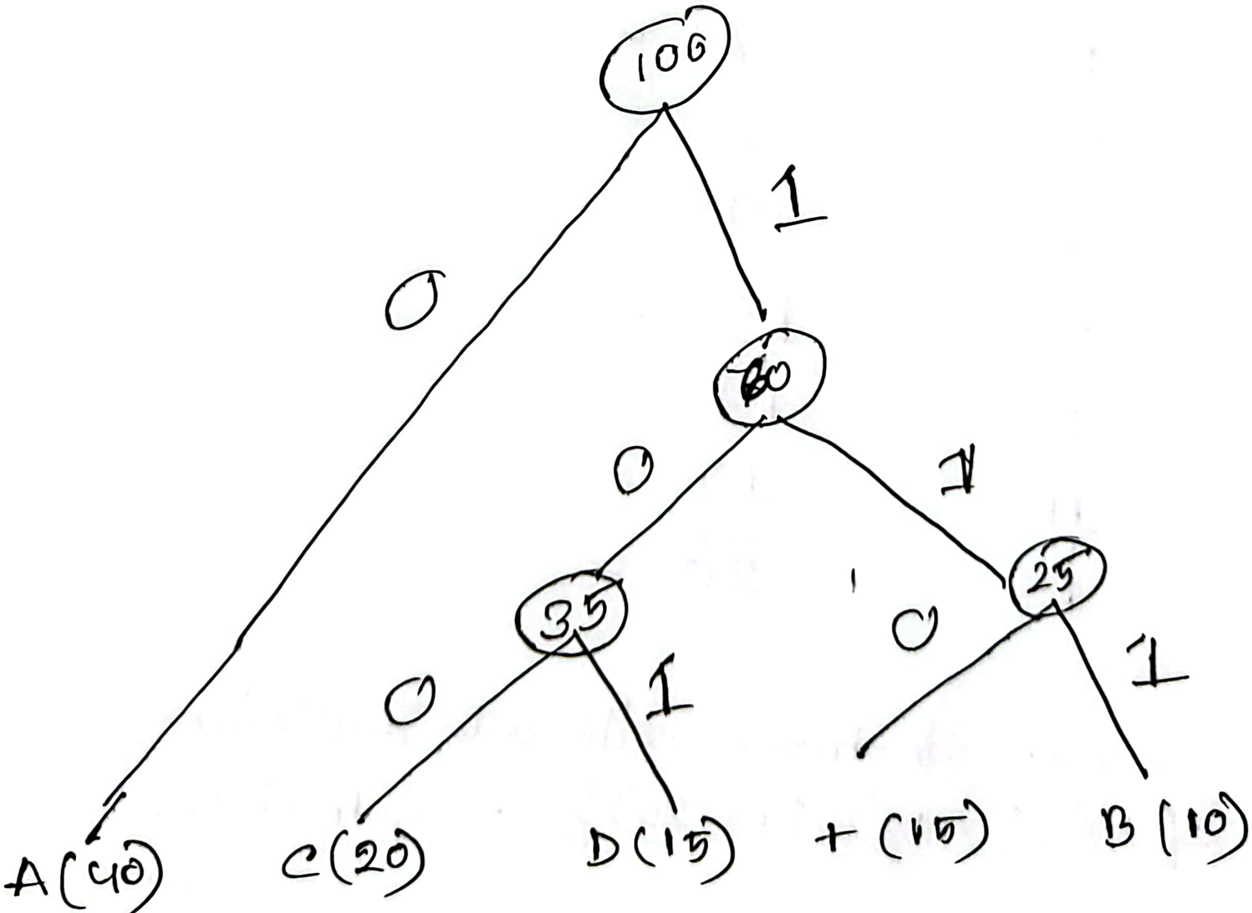
Greedy-1 Ans to the Ques no 3

a) i)

Symbol	Frequency	H.code
A	40	0
B	10	111
C	20	100
D	15	101
+	15	110

Sort: A(40), C(20), D(15), +(15), B(10)



(Huffman tree)

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ii) $\underbrace{1000}_{C}\,\underbrace{0}_{A}\,\underbrace{101}_{D}\,\underbrace{1100}_{+}\,\underbrace{0}_{A}\,\underbrace{101}_{D}\,\underbrace{0}_{A}$

∴ ~~De~~. Decoded : CAD+ADA

b) i) { [8, 13), [6,9), [11,14), [2,7), [1,7), [12,20),
[7, 13), [13,20) {

sort accoarding departure time

arrival	departure	
1	7	✓
2	7	
6	9	
7	13	✓
8	13	
11	14	
12	20	
13	20	✓

maxnum of train with out collision
{ [1,7), [7, 13), [13, 20) } = 3 trains.

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11)

If we apply greedy algorithm we can determine the minimum number of platform.

1st plateform → {[1,7), [7,13), [13,20)}

2nd plate-form → {[2,7), [8,13)}

3nd plateform → {[6,9), [11,14)}

4th plateform → {[12,20)}

∴ minimum 4 plate-form needed for without collision.

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Ans-to-the Ques. no 4

Greedy + DP

Item	weight (kg)	Price ($)
Jwelery	3	5
Sculpture	5	9
Painting	4	5
Book	1	4
mummy	12	6

Item ↓ weight →	0	1	2	3	4	5	6	7	8 [capacity]
0	0	0	0	0	0	0	0	0	0
Jwelery (3)	↓ 0	↓ 0	↓ 0	max(0,5) 5	max(0,5) 5	max(0,5) 5	max(0,5) 5	max(0,5) 5	max(0,5) 5
Sculpture (5)	↓ 0	↓ 0	↓ 0	↓ 5	↓ 5	max(5,9) 9	max(5,9) 9	max(5,9) 9	max(5,14) 14
Painting (4)	0	↓ 0	↓ 0	↓ 5	max (5,5) 5	max(9,5) 9	max([illegible]) 9	9	14
Book (1)	0	4	4	↓ 5	↓ 5	↓ 9	↓ 9	↓ 9	↓ 14
mummy (12)	0	0	0	0	0	0	0	0	0

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∴ max profit will be 14 $ if denver we dpAlgo.

(ii) According to nairobi if we use greedy Algo [Fractional Knapsack]

Item	weight	Profit	Per kg Profit
Jewelry	3	5	1.67
Sculpture	5	9	1.8
Painting	4	5	1.25
Book	1	4	4
Mummy	12	6	0.5

Sol

Nairobi belief remain valid

(Book 1kg) = 4

(Sculpture 5kg) = 9 total ⇒ 16.34 $.

(Jewelry 2kg) = 3.34

Ans to the Ques no 5

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DP-1

a) M[3][4]=2 means the longest common subsequence between "axy" and "abyxb" ~~is~~ has a length of 2. M[3][4] stores the length of the LCS between the first 3 elements of sequence of ("axyb") and ~~the~~ from ("abzxb") the first four element of sequence which is 2.

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b)

	empty	a	b	y	x	b
empty	0	0	0	0	0	0
a	0	↘ (0+1) 1	max(up,left) → 1	→ 1	→ 1	→ 1
x	0	↓ 1	→ 1	→ 1	↘ (1+1) 2	→ ~~1~~2
y	0	↓ 1	→ 1	↘ (1+1) 2	→ 2	→ 2
b	0	↓ 1	↘ (1+1) 2	→ 2	→ 2	↘ (2+1) $\boxed{3}$ ↓ final ans.

LCS (AA, YY, bb)

iii)

weight (8kg max)

	Empty	1	2	3	4	5	6	7	8
Empty	0	0	0	0	0	0	0	0	0
i(5)	0	0	0	0	0	~~0~~ 11	~~0~~ 11	~~0~~ 11	~~0~~ 11
ii(4)	0	0	0	0	10	max(10,11) 11	11	11	11
iii(6)	0	0	0	0	↓ 10	↓ 11	12	12	12
iv(3)	0	0	0	9	↓ 10	↓ 11	↓ 12	(10+9) 19	(11+9) $\boxed{20}$

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Object	weight	profit
i	5	11
ii	4	10
iii	6	12
iv	3	9

Ans: 20