Set-1, 3→4A Q:- LC of Knapsack $(P_1, P_2 \cdots P_5) = (10, 10, 12, 18)$, $w(w_1, w_2 \cdots w_5) = (2, 4, 6, 9)$ and $M = 15$.

Knapsack is a Bag or container.

objective : Less weight, more profit.

10 objects = 100 ₹

6 objects = 100 ₹ ✓

1st Convert all +ve to −ve.

$(+10, +10, +12, +18) = (-10, -10, -12, -18)$

2 Rules:- 1. lower Bound (Fractions allowed $\frac{1}{2}$ ✓)

2. upper Bound (no Fractions $\frac{1}{2}$ X)

Node 1:-

$P(-10, -10, -12, -18)$

$w(2, 4, 6, 9)$, $M = 15$.

LB

-18	3/9	3 → 9−6
-12	6	9 → 13−4
-10	4	13 → 15−2
-10	2	15 = M

$= -10 - 10 - 12 - 18 \times 3/9$ (2)

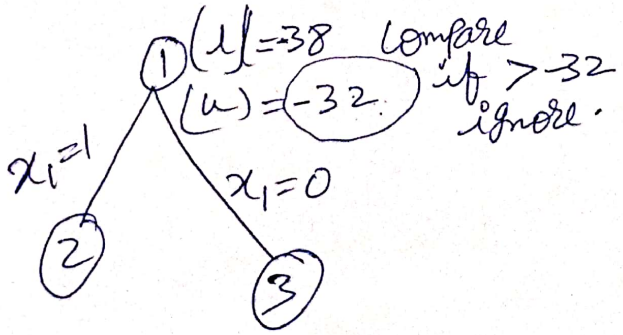
$= -32 - 6 = -38$

UB

-12	6	9
-10	4	13
-10	2	15

$= -10 - 10 - 12$

$= -32$



Node 2:-

Path $x_1 = 1$

LB

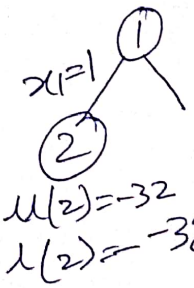
-18	3/9	3
-12	6	9
-10	4	13
-10	2	15

$= -38$

UB

-12	6
-10	4
-10	2

$= -32$



Node 3

Path $x_1 = 0$

(X, 4, 6, 9)

LB

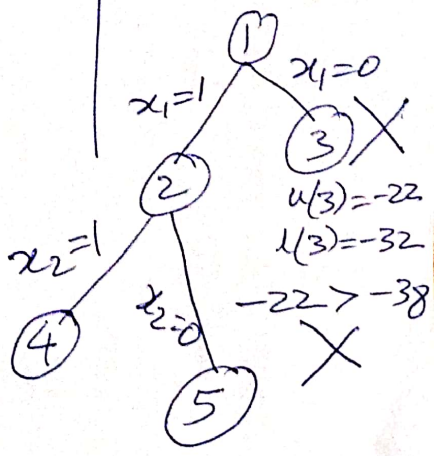
-18	5/9	5
-12	6	11
-10	4	15

$= -32$

UB

-12	6
-10	4

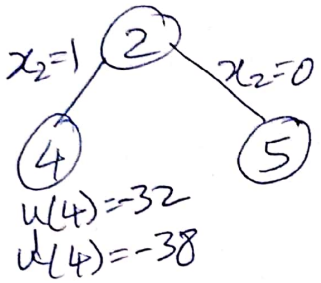
$= -22$



Node 4: Path: $x_4=1$, $x_2=1$

LB: 3/9, 6, 4, 2 → $=-38$

UB: 6, 4, 2 → $=-32$

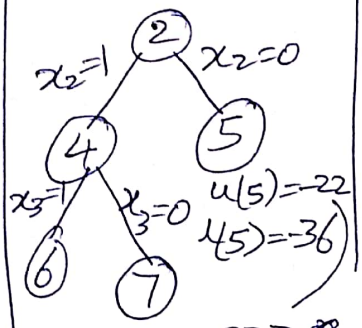


Node 5:- Path: $x_1=1, x_2=0$

$(2, \not{4}, 6, 9)$

LB: 7/9, 6, 2 → $=-36$

UB: 6, 2 → $=-22$

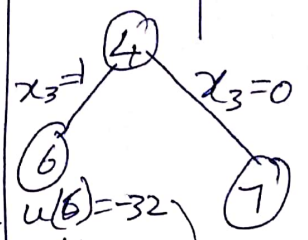


$-22 \not> -32$ ✗

Node 6:- Path: $x_1=1, x_2=1, x_3=1$

LB: 3/9, 6, 4, 2 → $=-38$

UB: 6, 4, 2 → $=-32$



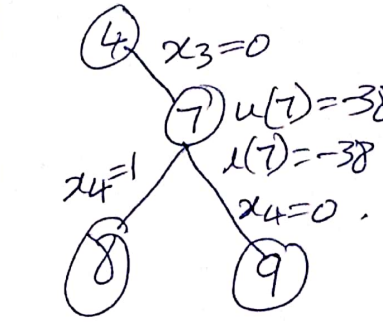
$-32 \geq -32$ ✗

Node 7:- Path $x_3=0$

$(2, 4, \not{6}, 9)$

LB: 9, 4, 2 → $=-38$

UB: 9, 4, 2 → $=-38$



Node 8: Path: $x_1=1, x_2=1, x_3=0, x_4=1$

$(2, 4, \not{6}, 9)$

LB: 9, 4, 2 → $=-38$

UB: 9, 4, 2 → $=-38$

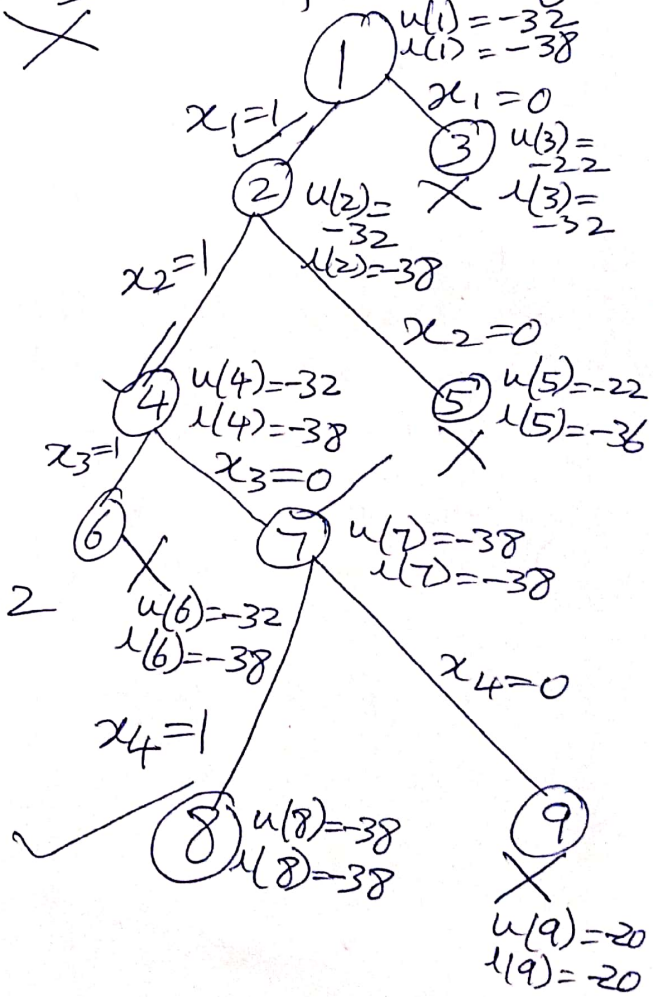
Node 9: Path; $x_1=1, x_2=1, x_3=0, x_4=0$.

LB: 4, 2 → $=-20$

UB: 4, 2 → $=-20$

$-20 \not> -32$ ✗

Final Dig



Final Path:

$x_1=1, x_2=1, x_3=0, x_4=1$.

Stop still ~~n=0~~ Path = 4.

Because we had only 4 paths (elements).