An. to the Q. NO - 1

a

Item	wei	Pro
1	3	12
2	4	8
3	6	15
4	8	17

capacity M = 10

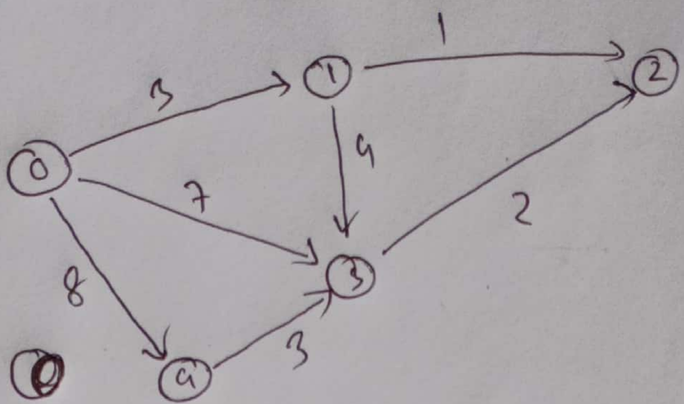
Pro
1 4
2 2
3 2.5
4 2.125

After decending sorts: (based on bi/wi)

	wi	bi	bi/wi	total wi	total bi	Remaining wi
1	3	12	4	3	12	10 − 3 = 7
2	6	15	2.5	3+6=9	12+15 = 27	7 − 6 = 1
3	8	17	2.125	9+1=10	27+2.125 = 29.125	1 − 1 = 0
4	4	8	2			

∴ The optimal solution is,
Total Maximum Profit is 29.125 A.

b



update 0:

$\boxed{0 \rightarrow 7,\ 0+3 < \infty}$

$0 \rightarrow 3,\ 0+7 < 8\infty$

$0 \rightarrow 8,\ 0+8 < \infty$

0	1	2	3	4
0	∞	∞	∞	∞
–	–	–	–	–

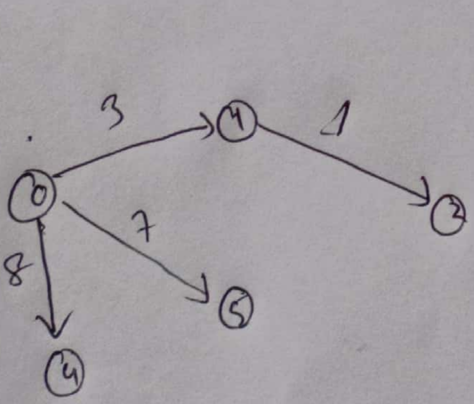
update 1:

$\boxed{1 \rightarrow 2,\ 3+3 < \infty}$

$1 \rightarrow 3,\ 3+4 \not< 7$

0	1	2	3	4
0	3	∞	7	8
–	0	–	0	0

update 2: all nodes are visited

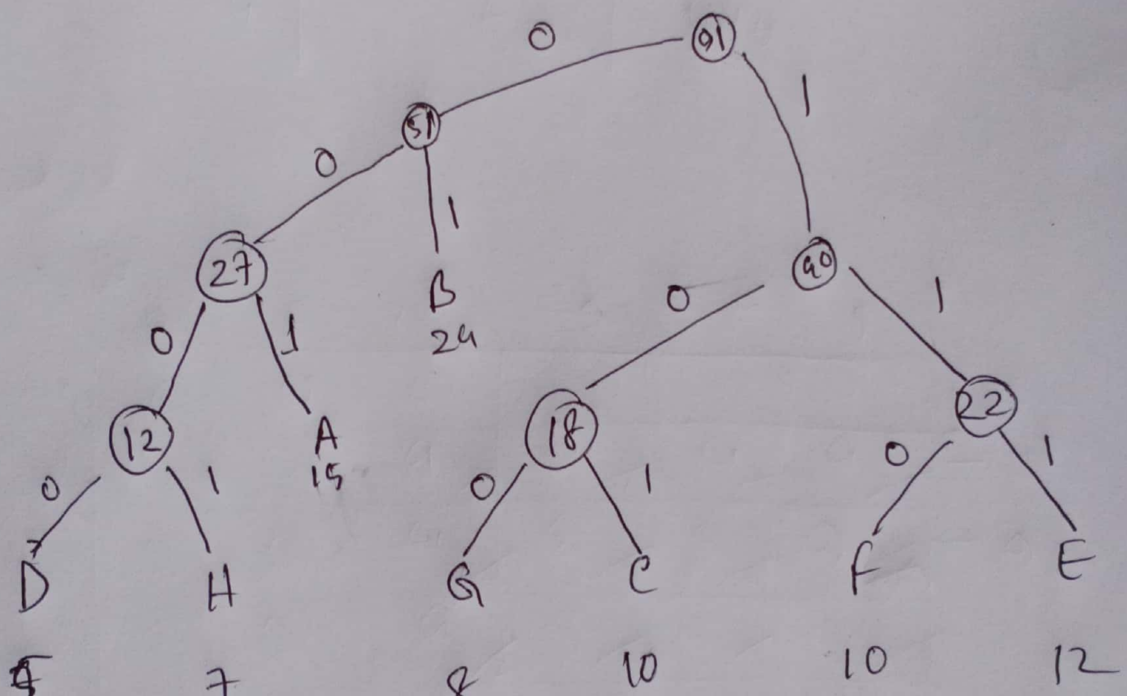


0	1	2	3	4
0	3	4	7	8
–	0	1	0	0

Ans to the Q-NO -2

a

Huffman Algorithm / coding is a lossless compression technique, which is used in data compression.



chars

A → 001

B → 01

C → 101

D → 0000

E → 111

F → 110

G → 100

H → 0001

b

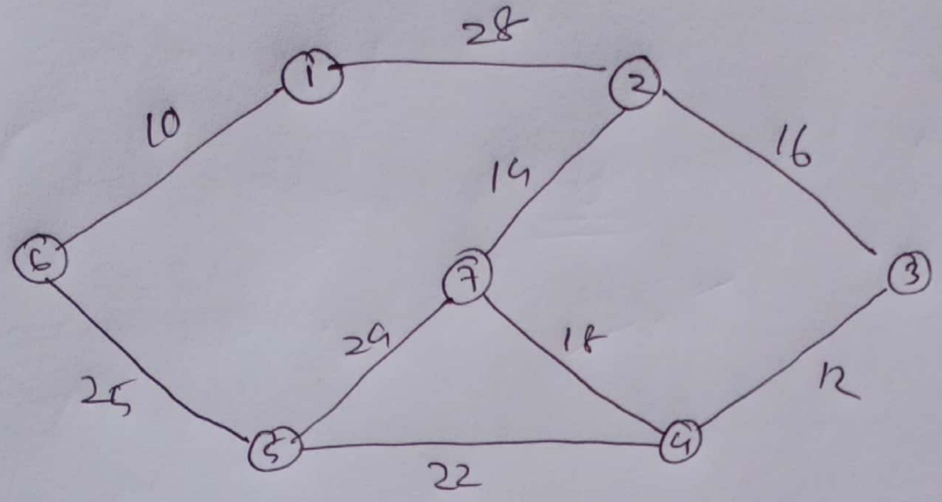
Item	weight	Benefit
1	2	\$4
2	3	\$5
3	4	\$6
4	6	\$10

I \ w	0	1	2	3	4	5	
0	0	0	0	0	0	0	
1	0	0	4 2	4 2	4 2	4 2	→ 4
2	0	0	4 2	5 3	5 3	9 2+3	→ 9
3	0	0	4 2	5 3	5 3	9 2+3	
4	0	0	4 2	5 2	5 3	$\boxed{9}$ 2+3	

So, Maximum benefit = 9

An to the Q. NO - 4

a



From starting node → 1

to → node : 6

10 {1,6}	28, {1,2}

node → 6

to → node 5

25, {6, 5}	28, {1.2}

node → 5

to → node → 4

22, {5,4}	24, {5,7}	24, {1,2}

node → 4

to → node - 3

12 {3,4}	18, {4,7}	24 { }	28 { }
		visited	visited

node : 3

to → node 2

16,{2,3}	14{4,7}	24{ }	25{ }

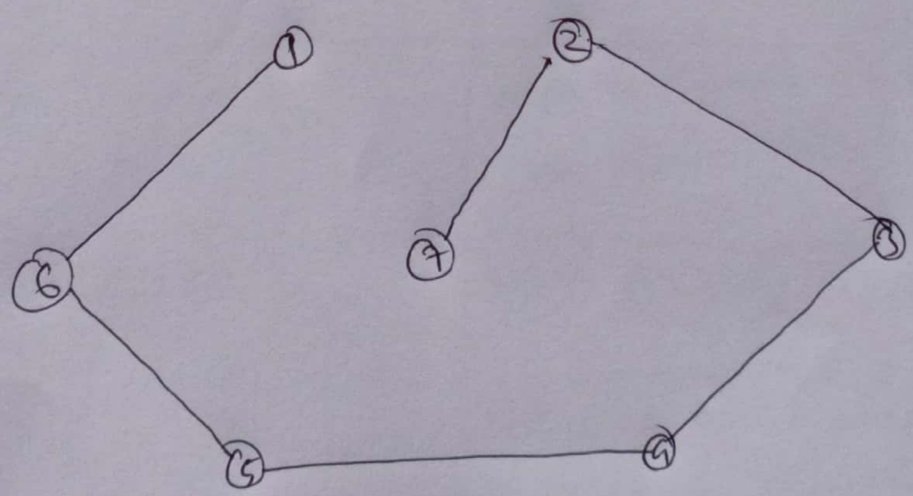
node : 2

to→node 7

14 {2,7}

~~The~~ we ~~all~~ already visited all of the nodes

So the mst we found is



b (from 4 NO)

$\overrightarrow{\text{int} \mid \text{su..} \; a[\,], \; b[\,]}^{\,n}$ 1 1

$\Rightarrow n + n + 1$

we choose biggest power of n,

so space complexity = O(P)

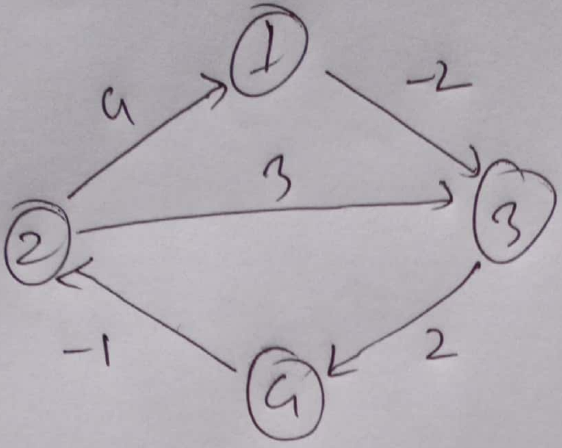
— b —

Ans. to the Q-NO – 3

b

Bellman ford	Dijkstra
less time consuming	more time consuming than Bellman ford.
implement easy to distributed	implement not easy to distributed.
used dynamic approach	used greedy approach
work on negative weight cycle	does not work on negative weight cycle.

4



A^0

	1	2	3	4
1	0	∞	-2	∞
2	4	0	3	∞
3	∞	∞	0	2
4	∞	-1	∞	0

A^1

	1	2	3	4
1	0	∞	-2	∞
2	4	0	2	∞
3	∞	∞	0	2
4	∞	-1	∞	0

$A_0[3,4]$ 2 $A[3,2] + [1,4]$
2 $\quad \infty \quad \infty$

$A[2,3] \quad A_0[2,1] + A[1,3]$
$3 > 4 \quad -2$

$A_0[4,1] < A_1[4,1] + [1,2]$
$1 \quad \infty \quad \infty$

$A_0[2,4] \quad A_0[2,1] + A_0[1,4]$
$\infty = 4 + \infty$

$A_0[4,5) \quad A_0[4,1] + [4,3]$
$\infty = \infty \quad \infty$

$A_0[4,2] \quad A_0[4,1] A_0[1,2]$
$\infty = \infty + \infty$

A_2

	1	2	3	4
1	0	∞	-2	∞
2	4	0	2	∞
3	∞	∞	0	2
4	3	-1	∞	0

$A_1[1,2]$ $\qquad$ $A_1[1,2] + [2,3]$

$-2 \quad < \quad \infty + 2$

$A_1[1,4]$ $\qquad$ $A_1[1,2] + [2,4]$

$\infty \quad = \quad \infty + \infty$

$A_1[3,1]$ $\qquad$ $A_1[3,2] + [2,1]$

$\infty \quad = \quad \infty + 4$

$A_1[3,4]$ $\qquad$ $A_1[3,2] + [2,4]$

$2 \quad < \quad \infty + \infty$

$A_1[4,1]$ $\qquad$ $A_1[4,2] + [2,1]$

$\infty \quad > \quad -1 \quad 4$

$A_1[4,3]$ $\qquad$ $A_1[4,2] + [2,3]$

$2 \quad > \quad -1 + -1$

A^3

	1	2	3	4
1	0	∞	-2	0
2	4	0	2	4
3	∞	∞	0	2
4	3	-1	∞	0

$A_2[1,2] > A_2[1,3] + [3,2]$

$\infty \quad\quad -2 \quad\quad \infty$

$A_2[1,4] > A_2[1,3] \quad [3,4]$

$\infty \quad\quad -2 \quad\quad 2$

$A_2[2,1] < A_2[2,3] \quad A_2[3,1]$

$4 \quad\quad 2 \quad\quad \infty$

$A_2[2,4] > A_2[2,3] \quad A_2[3,4]$

$\infty \quad\quad 2 \quad\quad 2$

$A_2[4,1] < A_2[4,3] \quad A_2[3,1]$

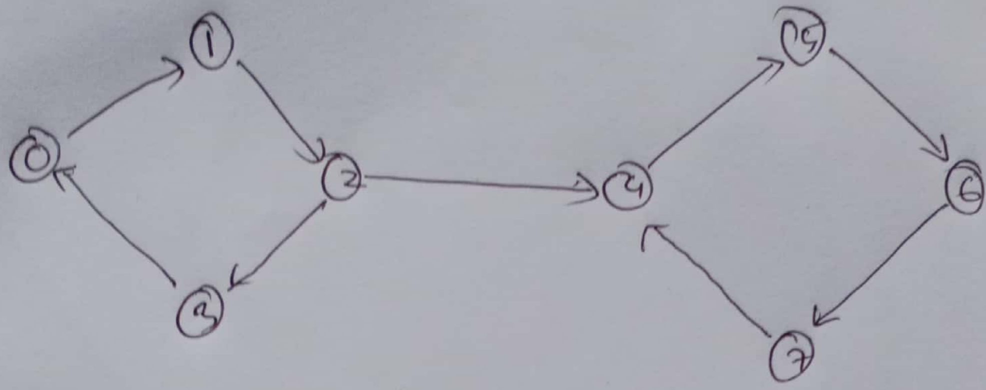
$3 \quad\quad \infty \quad\quad \infty$

$A_2[4,2] < A_2[4,3] \quad A_2[3,2]$

$2 \quad\quad \infty \quad\quad \infty$

Ans: to the Q. NO-5

a



~~Step~~

Step 1:

is visited

3	7	6
5	4	2
1	0	

Stacks

7 x	ii
6 x	iii
5 x	iv
4 x	v
3 x	i
2	vi
1	vii
0	viii

Step 2:

visited

1, 2, 3, 0 — (i)
5, 6, 7, 4 — (ii)

strongly connected component

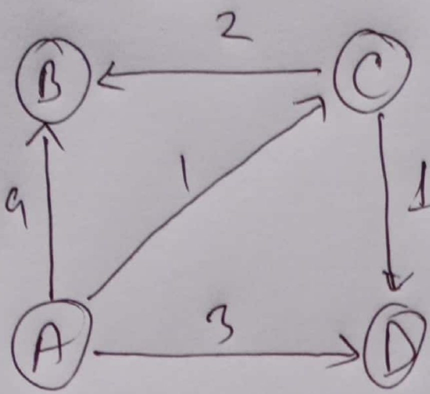
Stack:

5 ✗ — (v)
6 ✗ — (vi)
7 ✗ — (vii)
4 ✗ — (viii)
1 ✗ — (i)
2 ✗ — (ii)
3 ✗ — (iii)
0 ✗ — (iv)

SCC →

1, 2, 3, 0 ——— 5, 6, 7, 4

b



	A	B	C	D
	0	2	1	2
A	–	1	0	1
C	–	0	–	0
B	–	–	–	0
D	–	–	–	–

rooted graph;