Q.1 $T(n) = 3T(n/2) + n$

Ans. Masters theorem

comparing , $a = 3$, $b = 2$, $f(n) = n$

$\log_b a = \log_2 3 = 1.58$

$n^{\log_b a} = n^{1.58}$

$f(n) = n^1$

$n^{\log_b a} > f(n)$

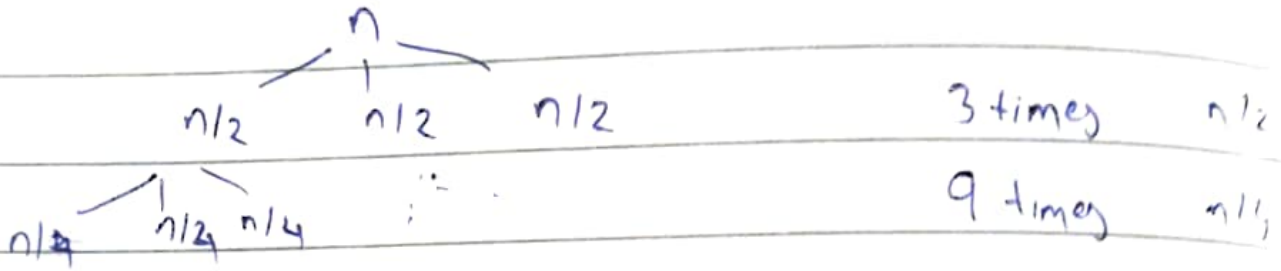
case 1:

$\therefore T(n) = \theta(n^{\log_b a})$

$= \theta(n^{1.58})$

Recursion Tree

$T(n) = 3T(n/2) + n$



$n/2^i$ $n/2^i$ 3^i times $n/2^i$

continues till $n/n = 1$ ie $2^i = n$

$\therefore i = \log_2 n$

At this level, cost $= 3^{\log_2 n}$

$= \log n^{\log_2 3}$

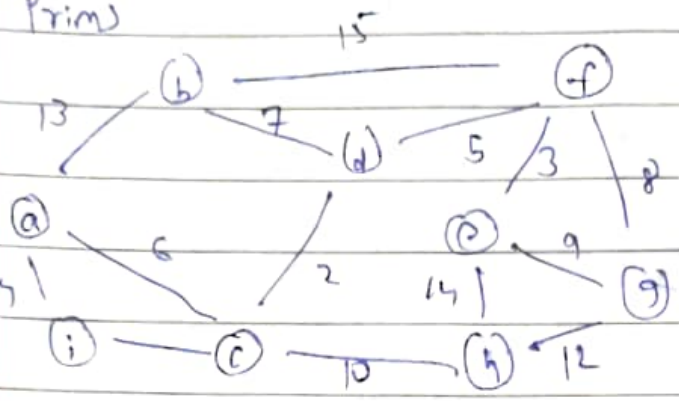
Total cost $= n + 3n/2 + 9n/4 + \cdots n^{\log_2 3}$

$= O(n \log n)$

$= \Theta(n^{\log_2 3})$

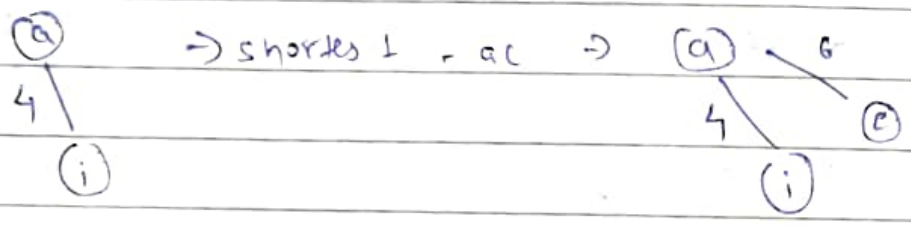
$= O(n^{1.58})$

Prim's

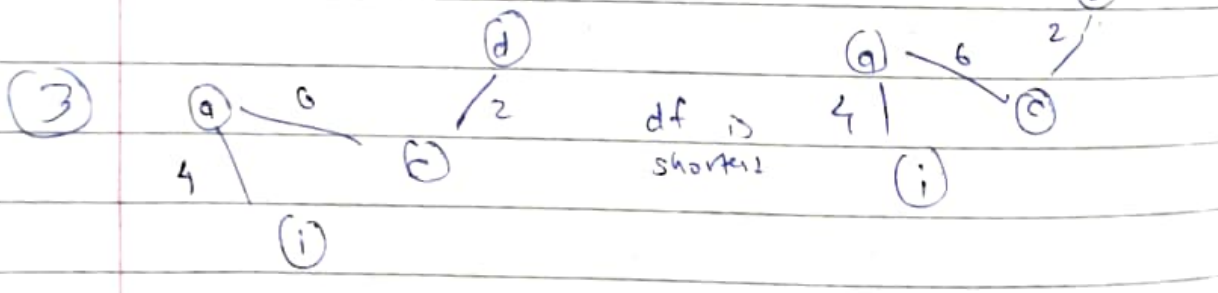


Root = a

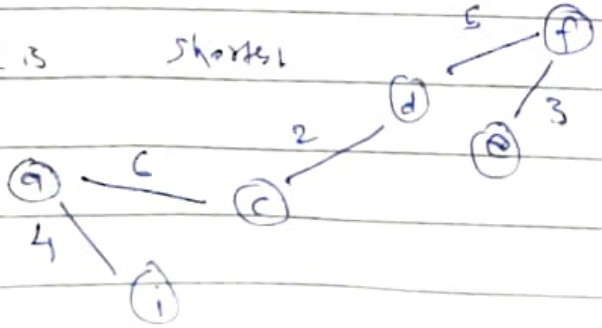
Shortest ~~edge~~ ai = 4

(1) 

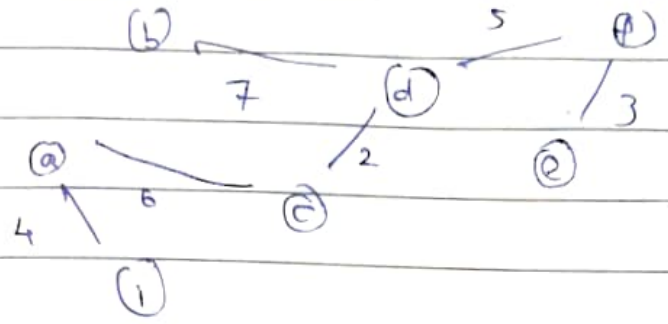
Shortest cd

(3) 

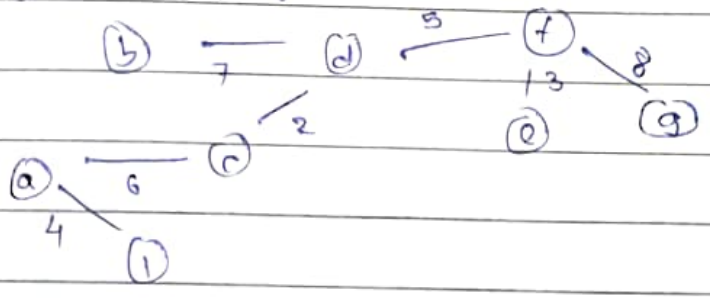
(5) ae is shortest



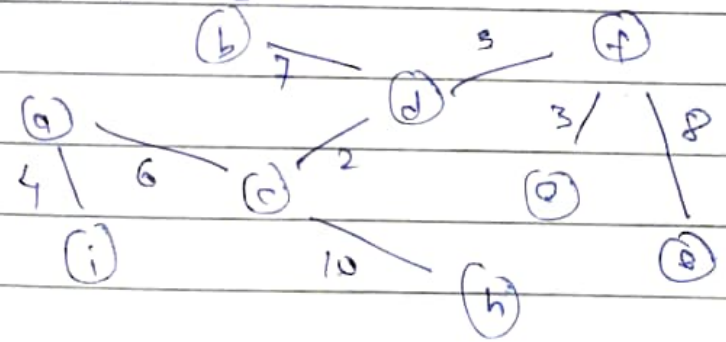
(6) bd is shortest



(7) fg is shortest



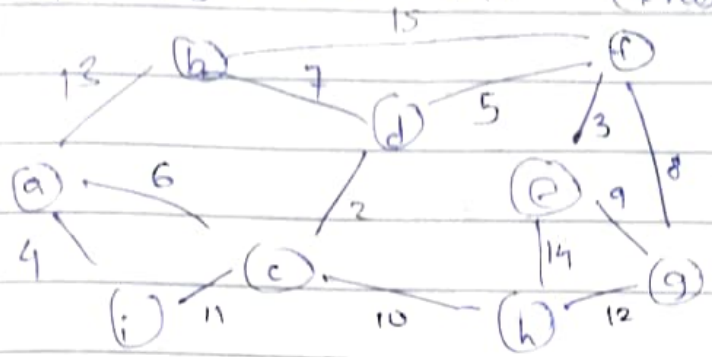
(8) ch is shortest



MST = 4 + 6 + 2 + 7 + 10 + 5 + 3 + 8

= 45

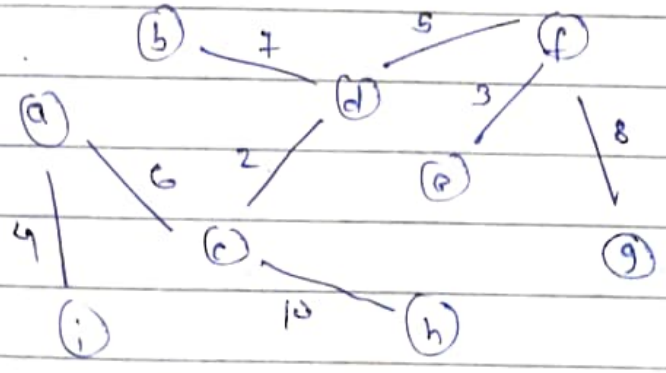
Q. Find MST for dotted (Kruskal)



ab	bf	fg	gh	ch	ci	ai	ac	bd	dc	df	ef	eg	eh
13	15	8	12	10	11	4	6	7	2	5	3	9	14

Asc

2	3	4	5	6	7	8	9	10	11	12	13	14	15
dc	ef	ai	df	ac	bd	fg	eg	ch	ci	gh	ab	eh	bf
✓	✓	✓	✓	✓	✓	✓	X	✓	X	X	X	X	X



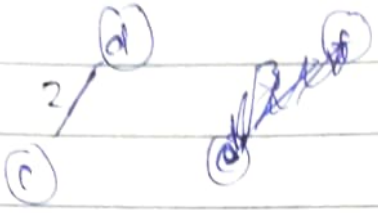
- Final Answer

MST = 2+3+4+5+6+7+8+10

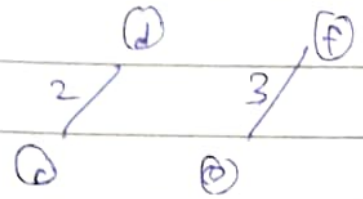
= 45

Kruskal step by step

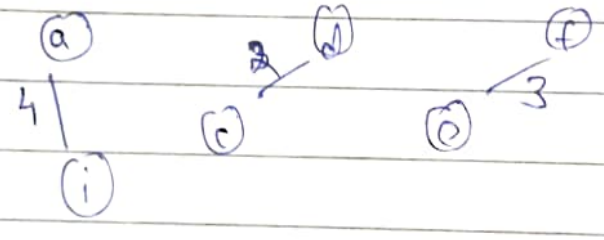
(1)



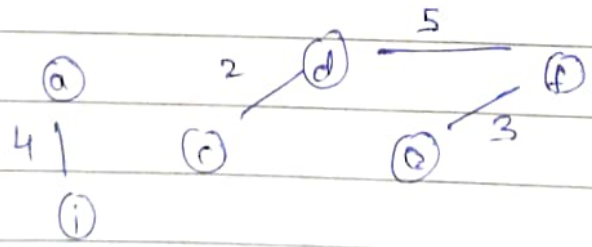
(2)



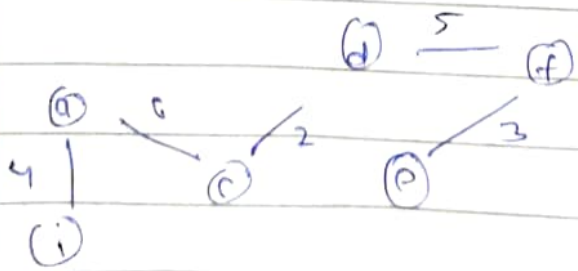
(3)

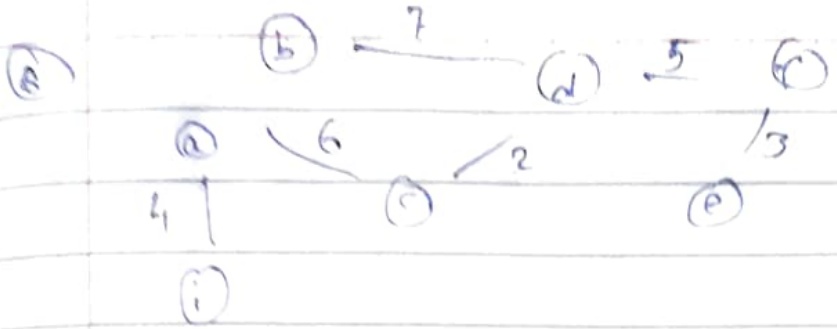


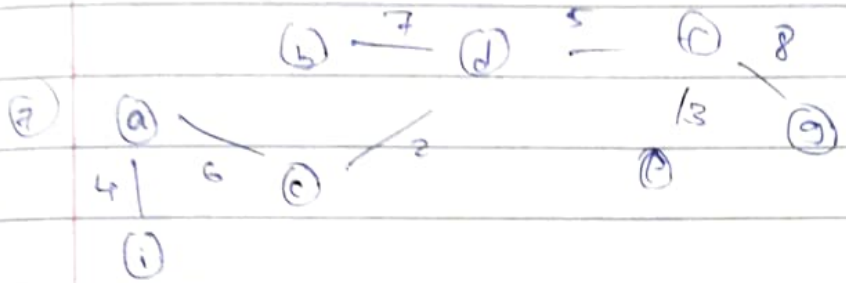
(4)

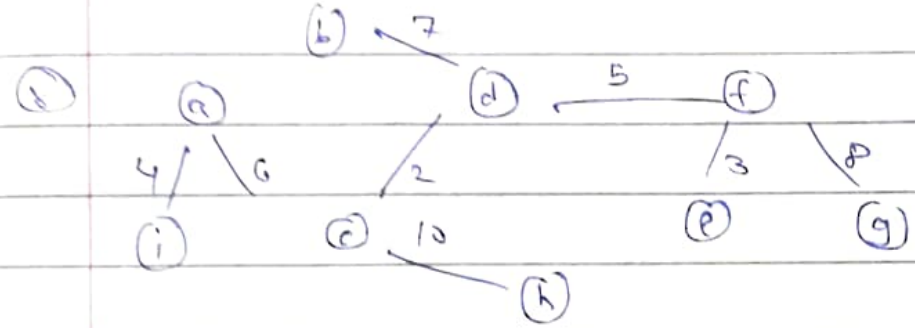


(5)









MST = 4 + 6 + 10 + 2 + 7 + 5 + 3 + 8

= 45