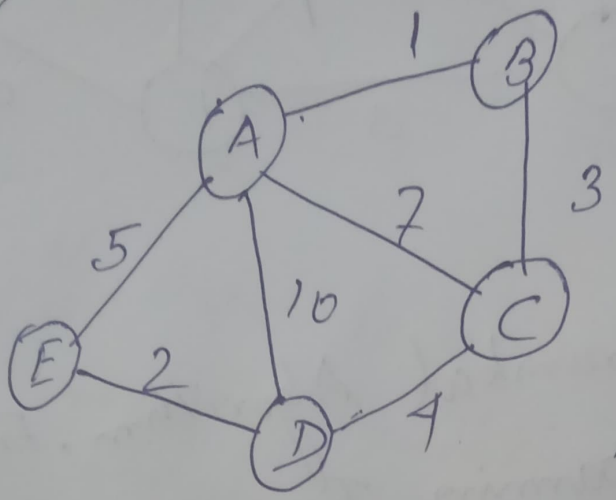
Name : Shubham Dutta
Year : 2nd
Section : 2B
Stream : CST
Roll No. : 58
Enrollment No. : 12019009022112
Paper Name : Design & Analysis of Algorith
Paper Code : PCC-CS402
Signature : Shubham Dutta
Date : 09/05/2021

Answers

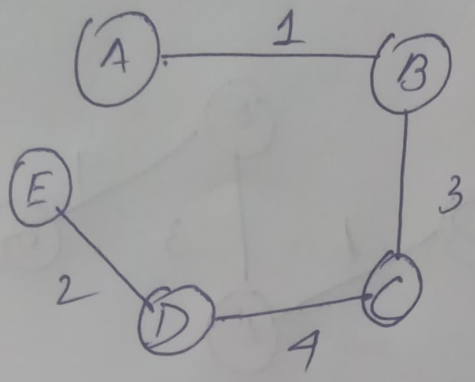
1. B)



This is the Graph

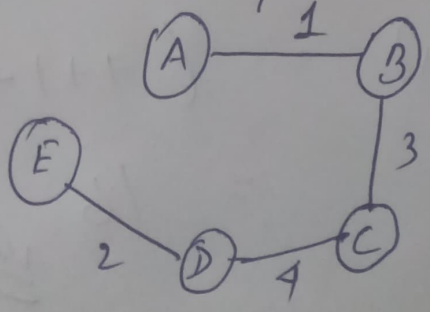
No. of vertex = 5

No. of edges = 4



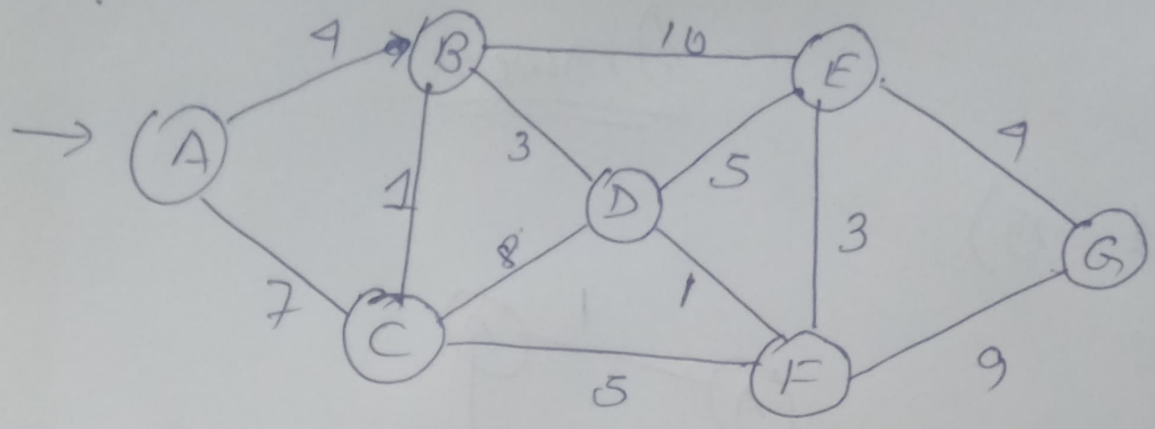
$A \to E$, $A \to D$, $A \to C$ not possible as it will form a cycle.

So minimum spanning tree is



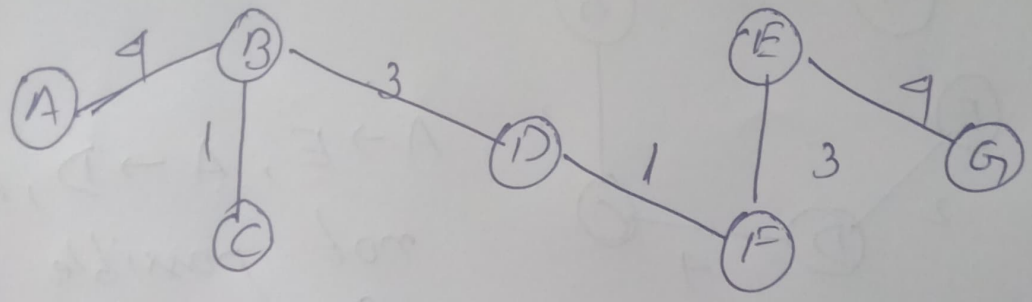
Total weight = 10

3. A)



From A

Use Kruskal Algorithm. Find minimum spanning Tree From the given graph



Minimum.

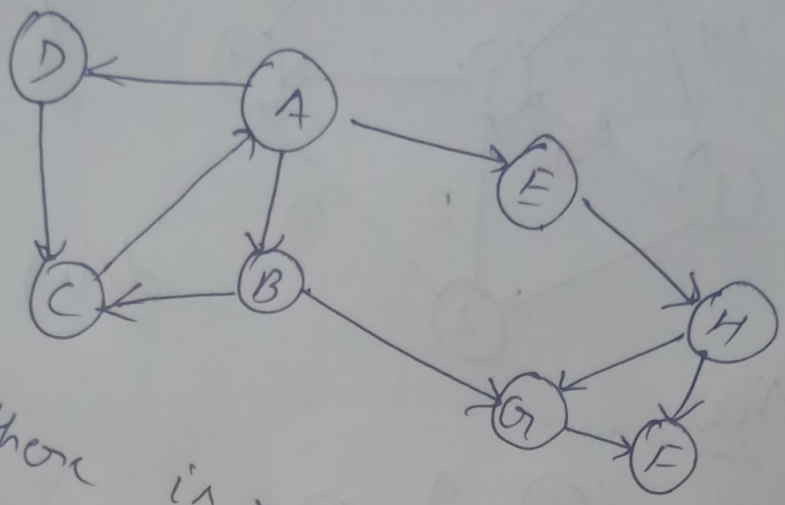
Travel ~~cost~~ cost := Minimum cost of Spanning Tree

Minimum cost = (4+1+3+1+3+4)

= 16

A

4. B)



If there is even a division between multiple neighbour nodes in the BFS & DFS algo. We will always choose letter closest to the beginning of alphabet first.

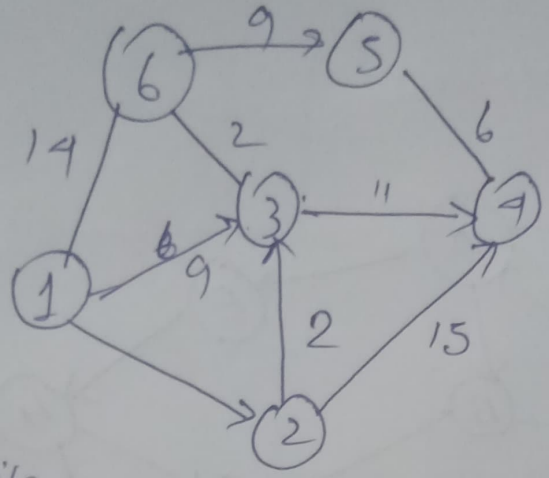
Process:

A → B → D
B → C → E → G
D → C
C → A
E → H
G → F
H → F → G

DFS is ABCEHFGD

So, the Breadth First search for given graph is ABDCEGHF

5. B)

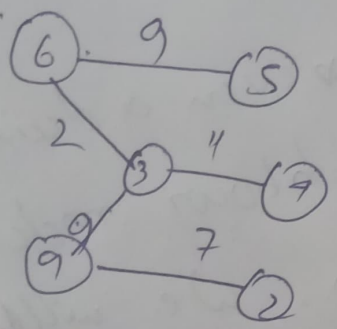


∴ Dijkstra Algo

If $d(u) + c(u,v) < d(v)$

$d(v) = d(u) + c(u,v)$

Now



Source	Destination				
	2	3	4	5	6
•	∞	∞	∞	∞	∞
1.	(7)	9	∞	∞	14
1, 2	(7)	9	22	∞	14
1, 2, 3	(7)	(9)	20	∞	(11)
1, 2, 3, 6	(7)	(9)	20	∞	(11)
1, 2, 3, 6	(7)	(9)	20	∞	(11)
1, 2, 3, 6, 4	(7)	(9)	20	∞	(11)
1, 2, 3, 6, 4	(7)	(9)	(20)	(20)	(11)
1, 2, 3, 6, 4, 5	(7)	(9)	(20)	(20)	(11)

∴ All Shortest path from vertex 1 is 1 //

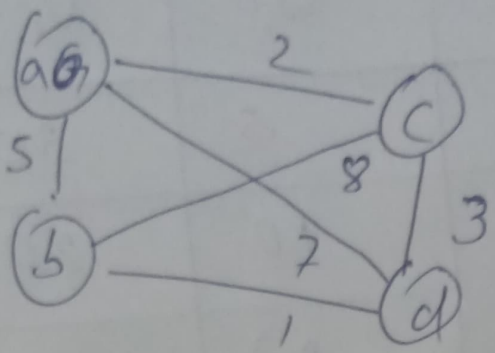
6. A)

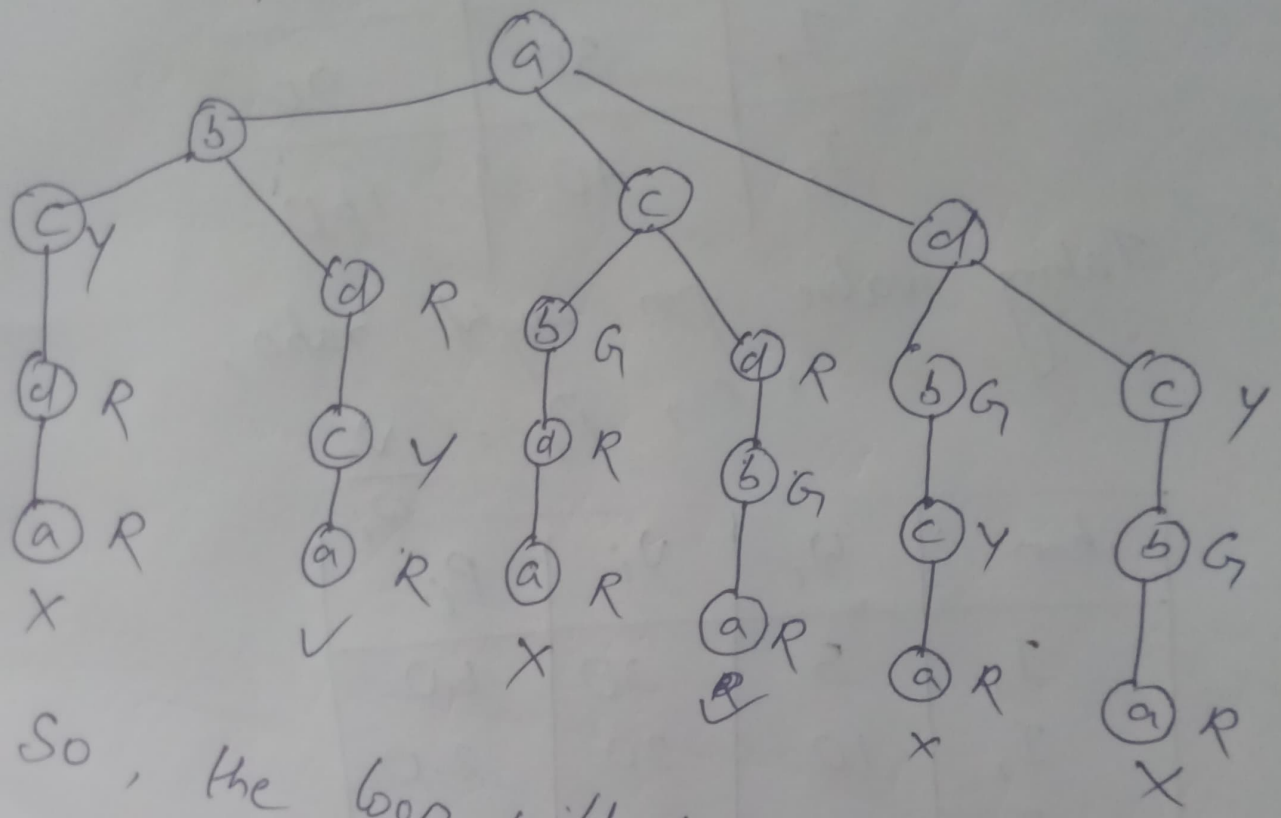
item	w_i	v_i
I_1	5	30
I_2	10	20
I_3	20	100
I_4	30	90
I_5	40	160

Taking value per weight ratio, i.e, $p_i = \frac{v_i}{w_i}$

item	w_i	v_i	p_i
I_1	5	30	6.0
I_2	10	20	2.0
I_3	20	100	5.0
I_4	30	90	3.0
I_5	40	160	4.0

2.4)





So, the loop will be a-b-d-c-a

& a-c-d-b-a

where a is Red, b is green, c is yellow & d is Red.

7. B)

→ Tractable Problem :- A problem that is solved by a polynomial time algorithm.

The upper bound is polynomial

Ex :-

-) Searching an unsorted list
-) Searching an ordered list
-) Sorting a list
-) Multiplication of integers
-) Finding minimum spanning tree in graph

→ Intractable :- A problem that cannot be solved by a polynomial time algorithm

The lower bound is exponential.

From a computational complexity, for these problems, there exists no efficient algorithm to solve them.

Ex :-

-) List all permutations of n numbers.
-) Towers of Hanoi we call prove that any algorithm that solves this problem