Introduction To Graph
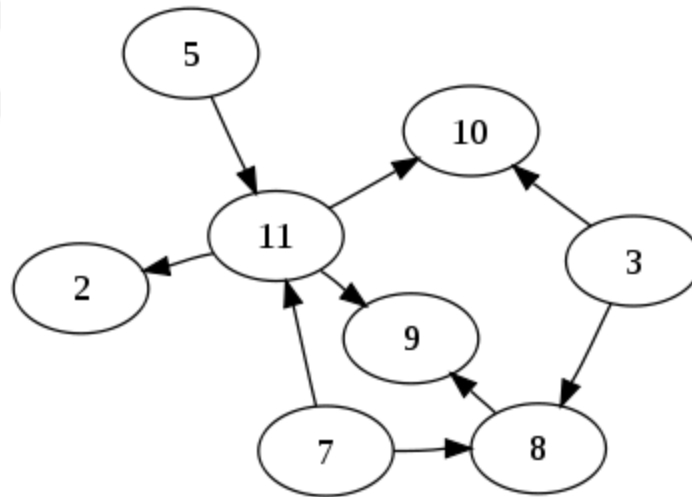
By Yash Gupta

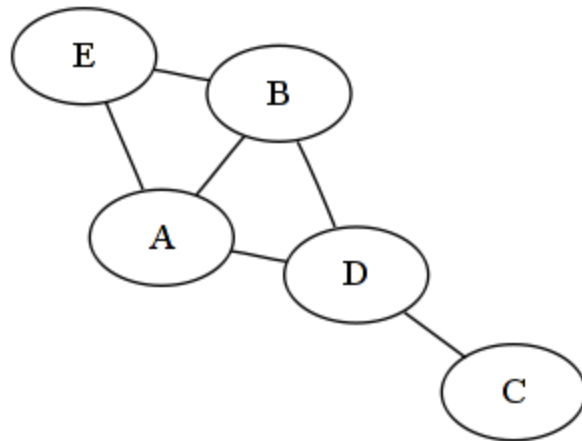- A graph is a collection of nodes called vertices, and line segments called arcs, that connect pair of nodes

Graph Terminologies

- Directed Graph (Diagraph) : A graph in which each line has a direction (arrow head) to its successor.

- Undirected Graph : A graph in which there is no direction on any of lines representing bidirectional arc

- In-Degree : The no of arcs entering a vertex
- Out-Degree : The no of arcs leaving a vertex

Implementation Ways

- Adjacency Matrix
  - Size Must be known
  - Only one edge between two vertices
- Adjacency List

Traversal
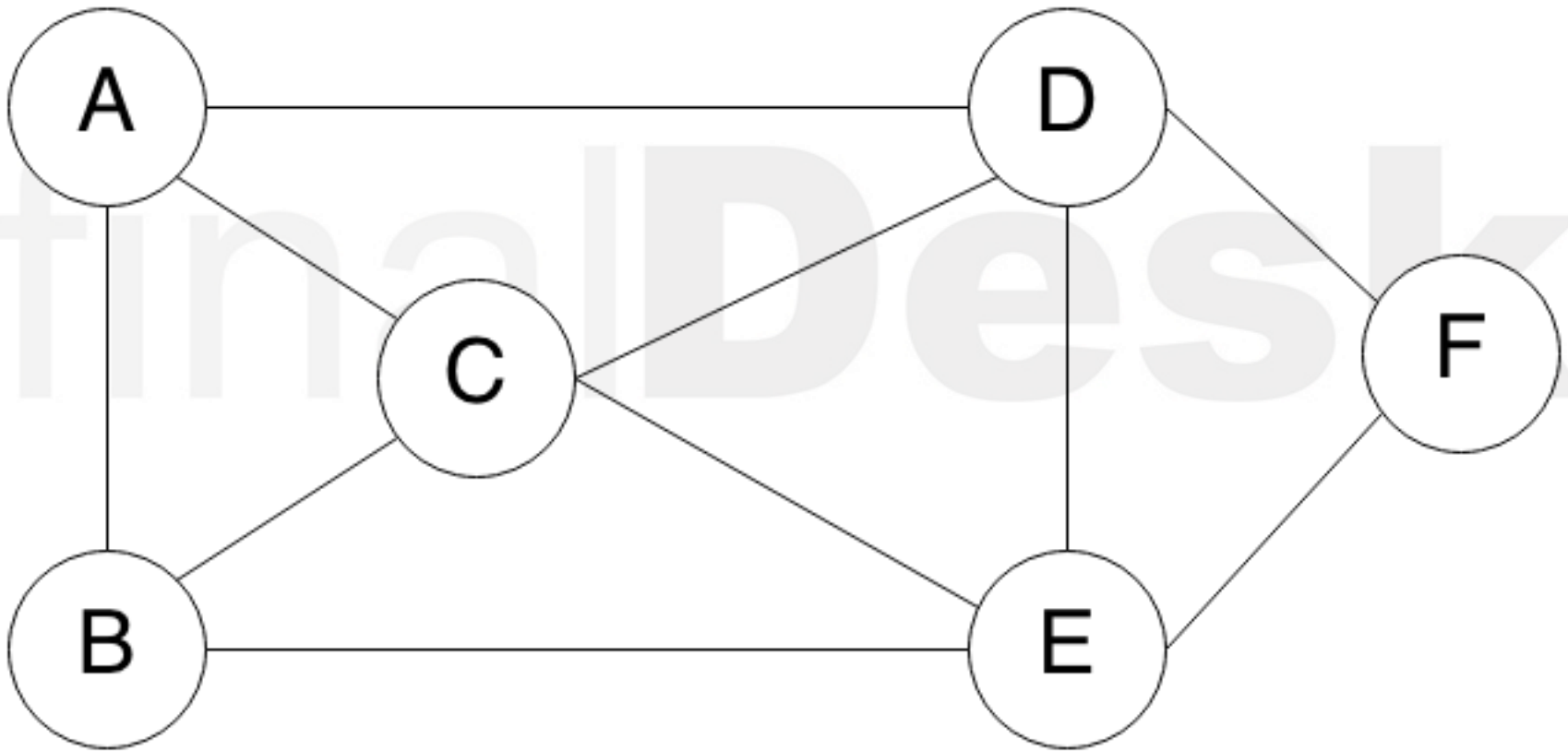
Minimum Spanning Tree

- Each Vertex is included
- Total edge weight of spanning tree is minimum

	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B						
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B			10		5	
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B			10		5	
C						
D						
E			20	15		5
F						

	A	B	C	D	E	F
A		5	15	10		
B			10		5	
C						
D						
E			20	15		5
F				10		

	A	B	C	D	E	F
A		5	15	10		
B			10		5	
C						
D						
E			20	15		5
F				10		

	A	B	C	D	E	F
A		5	15	10		
B			10		5	
C						
D						
E			20	15		5
F				10		

	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

Shortest Path Algorithm
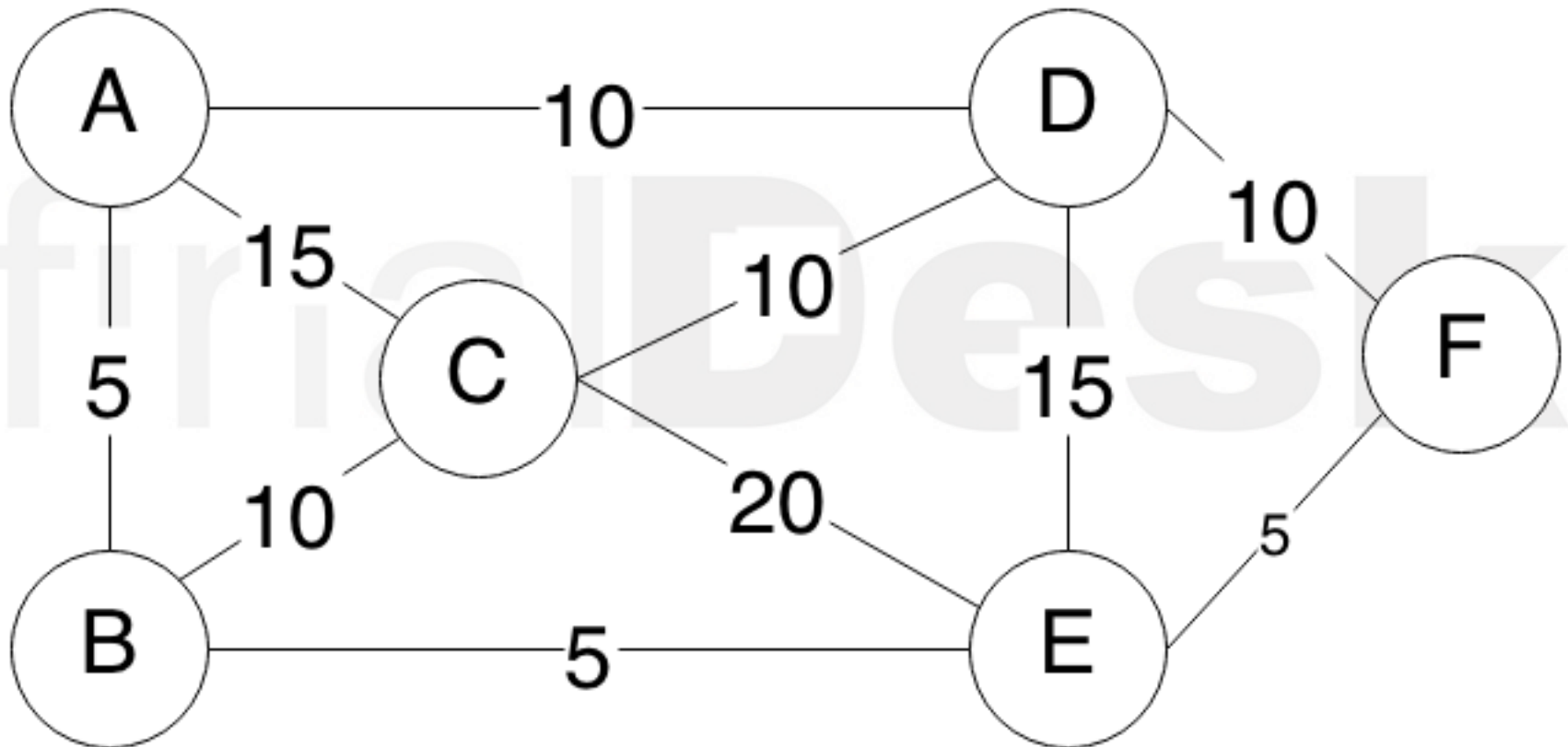
Shortest Path : A - F

	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B						
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B			15		10	
C						
D						
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B			15		10	
C						
D			20		25	20
E						
F						

	A	B	C	D	E	F
A		5	15	10		
B			15		10	
C						
D			20		25	20
E			30			15
F						

	A	B	C	D	E	F
A		5	15	10		
B			15		10	
C						
D			20		25	20
E			30			15
F						

F-E-B-A

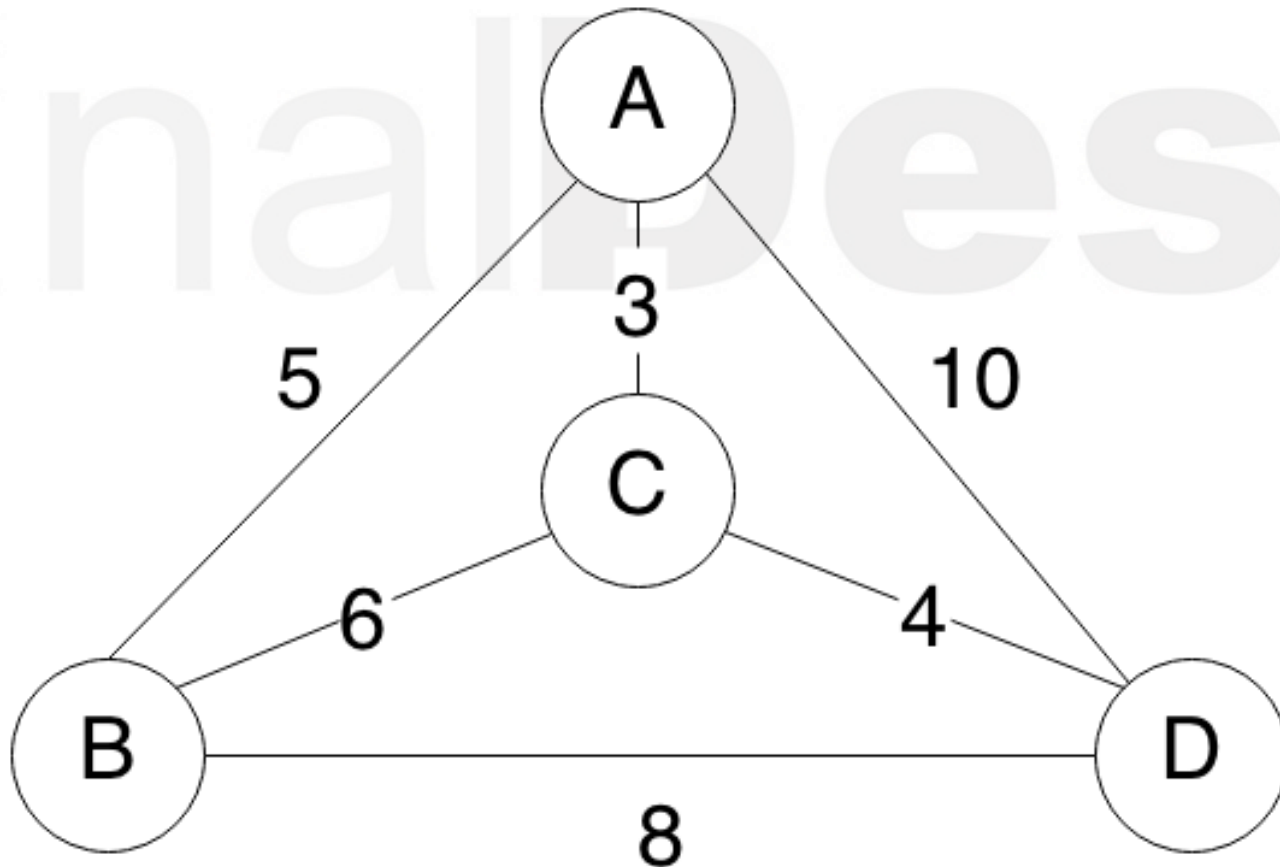|	A	B	C	D	E	F
A		5	15	10		
B			15		10	
C						
D			20		25	20
E			30			15
F						

Hamiltonian Cycle

- Visit Each Vertex Only Once
- There should be an edge from last to first vertex
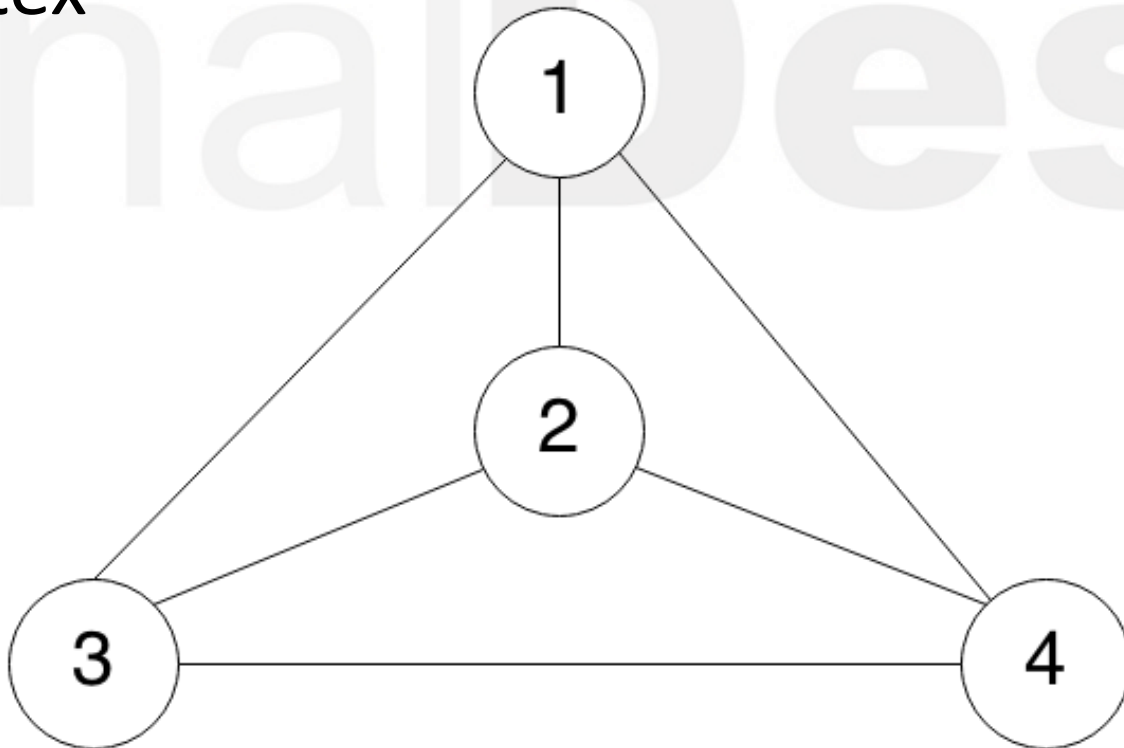
Roaming Engineers Problem

- Must Contain an Hamiltonian Cycle
- Shortest Path

	A	B	C	D
A				
B				
C				
D				

	A	B	C	D
A		5	3	10
B				
C				
D				

	A	B	C	D
A		5	3	10
B				
C		9		7
D				

	A	B	C	D
A		5	3	10
B				
C		9		7
D		15		

	A	B	C	D
A		5	3	10
B				
C		9		7
D		15		

	A	B	C	D
A		5	3	10
B	19			
C		9		7
D		15		

Contact Info

- trainers@finaldesk.com
- rishabh@finaldesk.com
- nilesh@finaldesk.com
- jignesh@finaldesk.com
- yash@finaldesk.com
- anand@finaldesk.com