DESIGN & ANALYSIS OF ALGORITHM

PCC-CS501

DESIGN & ANALYSIS OF ALGORITHM
SCHEDULE ----TOPIC WISE

	Topic	Sub Topic
1	INTRODUCTION	DESIGN OF ALGORITHM ,ANALYSIS OF ALGORITHM, ALGORITHM PROPERTIES
2	FRAMEWORK FOR ALGORITHM ANALYSIS	HOW TO COUNT EXECUTION TIME OF ALGORITHM,INPUT INSTANCES
3	ASYMPTOTIC NOTATION	BEST CASE,AVERAGE CASE, WORST CASE
4	SOLVING RECURRENCE RELATION	SUBSTITUTION METHOD, MASTER THEOREM
5	ALGORITHM DESIGN TECHNIQUES	DIVIDE & CONQUER, GREEDY,DYNAMIC PROGRAMMING, BACKTRACKING,
6	DISJOINT SET MANIPULATION	UNION FIND
7	NETWORK FLOW PROBLEM	FORD FULKERSON ALGORITHM
8	NP COMPLETENESS	NP,NP HARD……ALGORITHM
9	APPROXIMATION ALGORITHM	COMPLEXITY ANALYSIS OF NP COMPETE PROBLEM

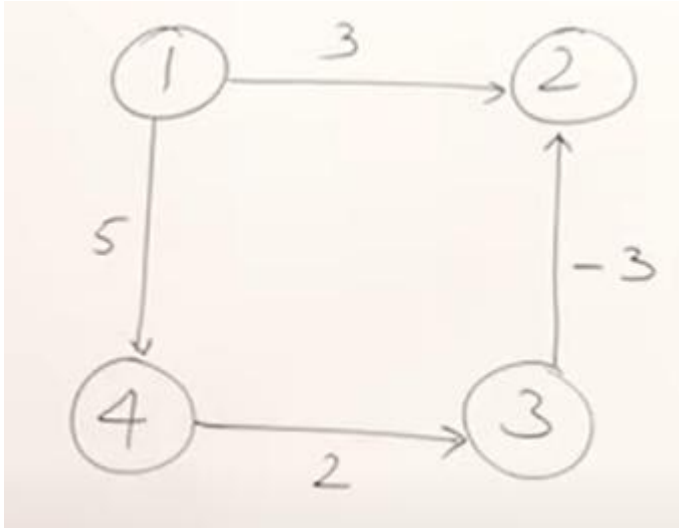
BELLMAN FORD ALGORITHM

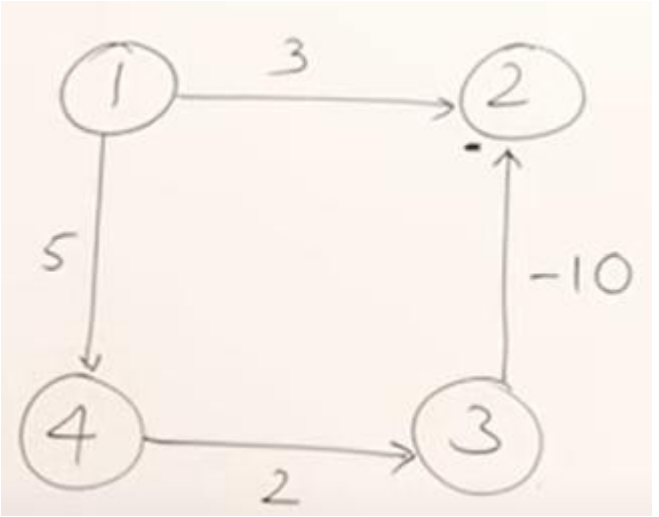
- SINGLE SOURCE SHORTEST PATH ALGORITHM

DRAWBACK

DIJKSTRA ALGORITHM

- May or May not Support Negative weight edge.

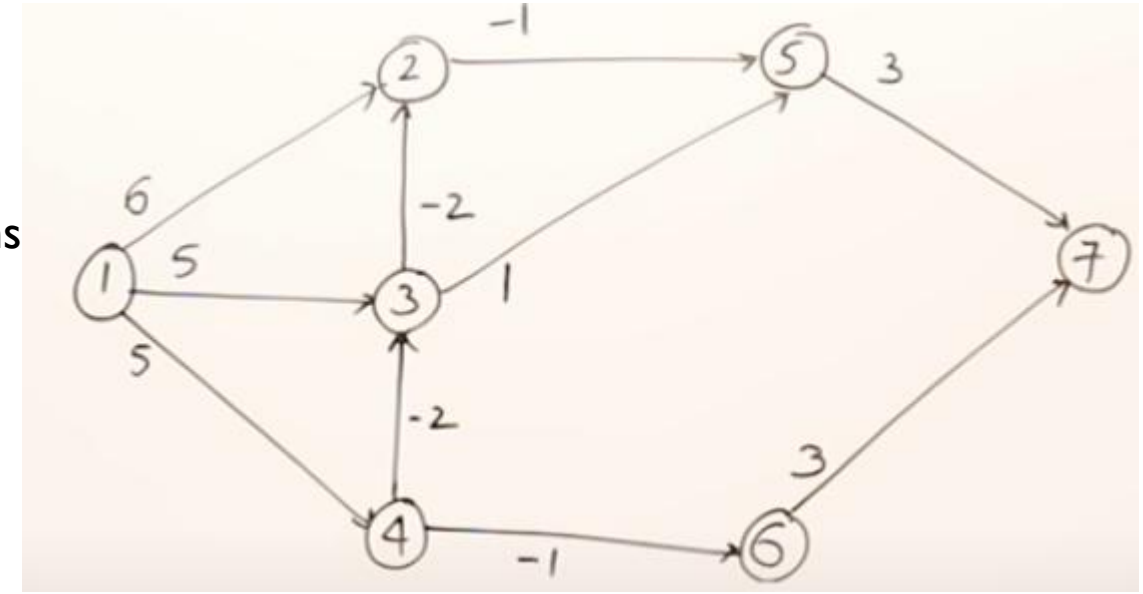


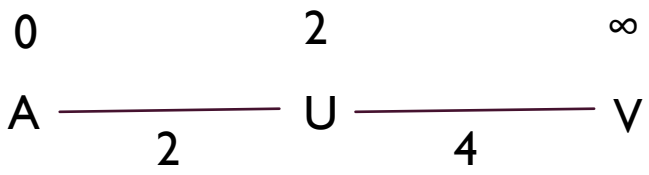


BELLMAN FORD ALGORITHM DYNAMIC PROGRAMMING

- Applicable on directed / undirected graph
- Optimization Problem
- Rule of Relaxation

It is similar to Dijkstra's algorithm but it can work with graphs in which edges can have negative weights.

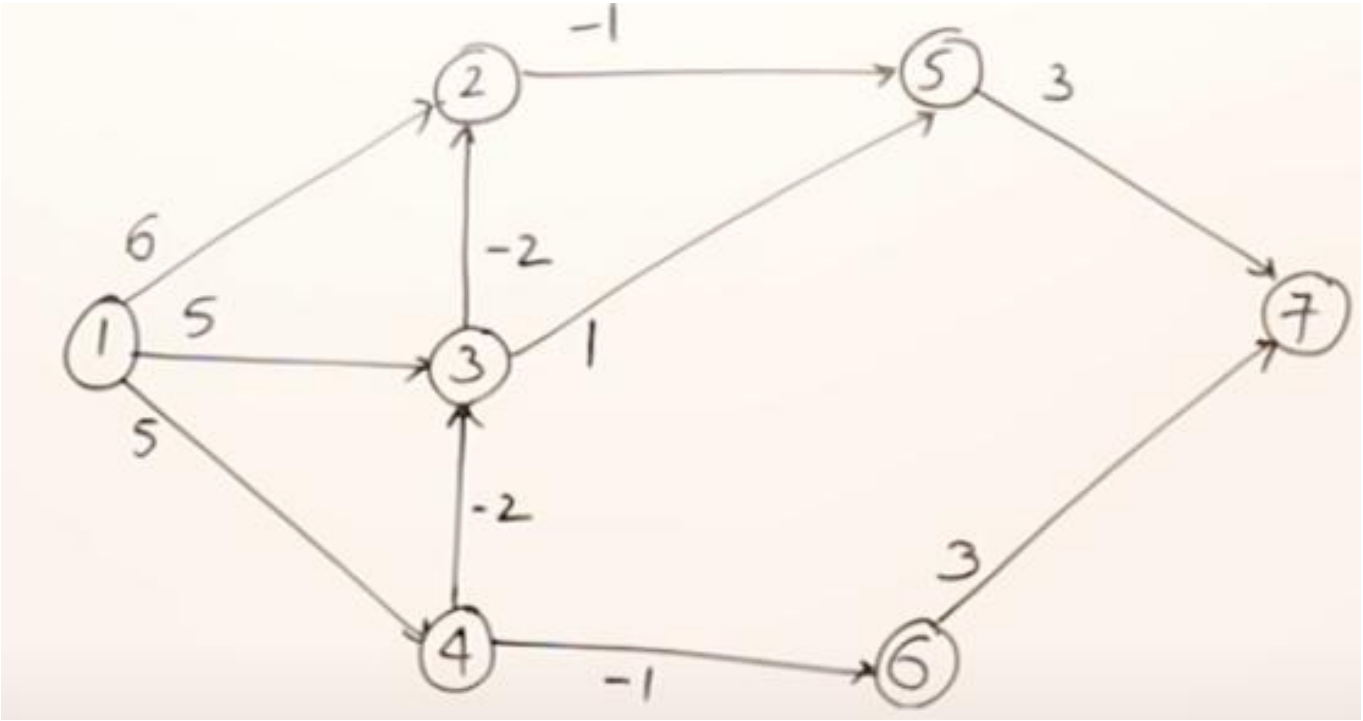




IF (d[U]+C[U,V]) < d[V]) THEN
SET d[V] ← d[U]+C[U,V]

BELLMAN FORD ALGORITHM

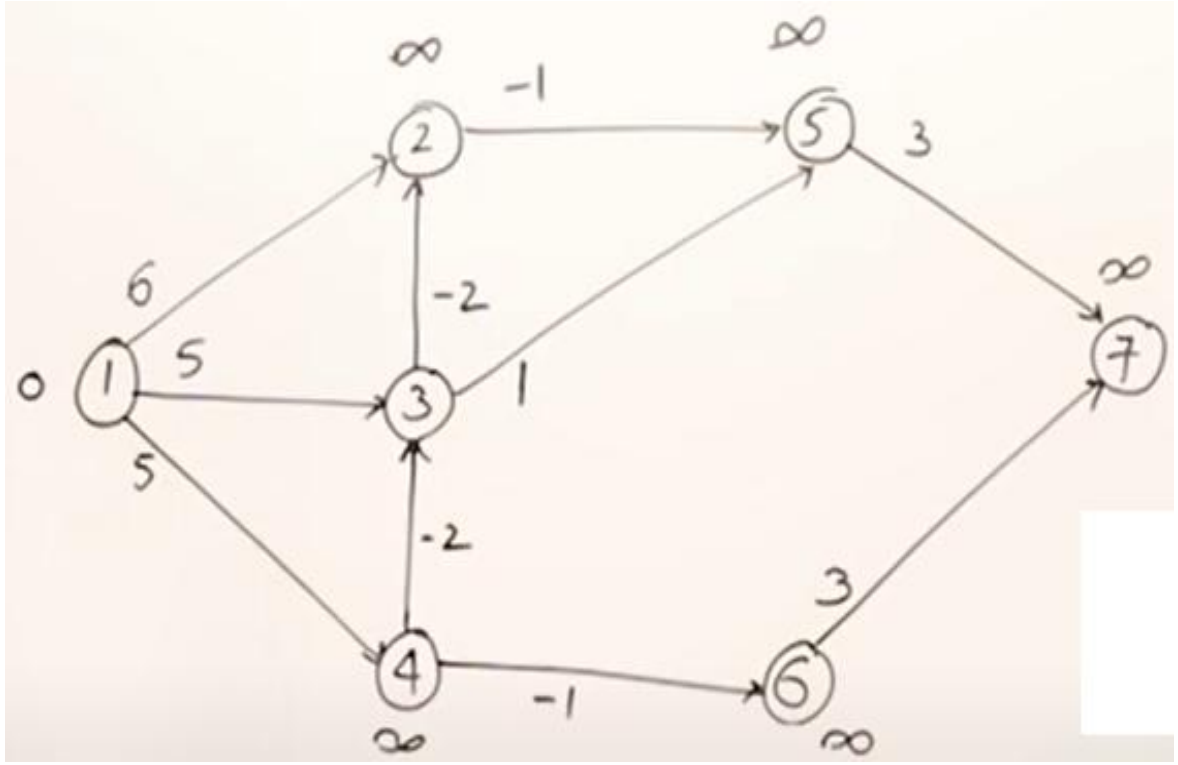
- Start vertex : 1
- Visit |V|-1 time all the edges.



BELLMAN FORD ALGORITHM
RELAX THE EDGES (1,2)(1,3)(1,4)(2,5)(3,2)(3,5)(4,3)(4,6)(5,6)(6,7)

- Start vertex : 1

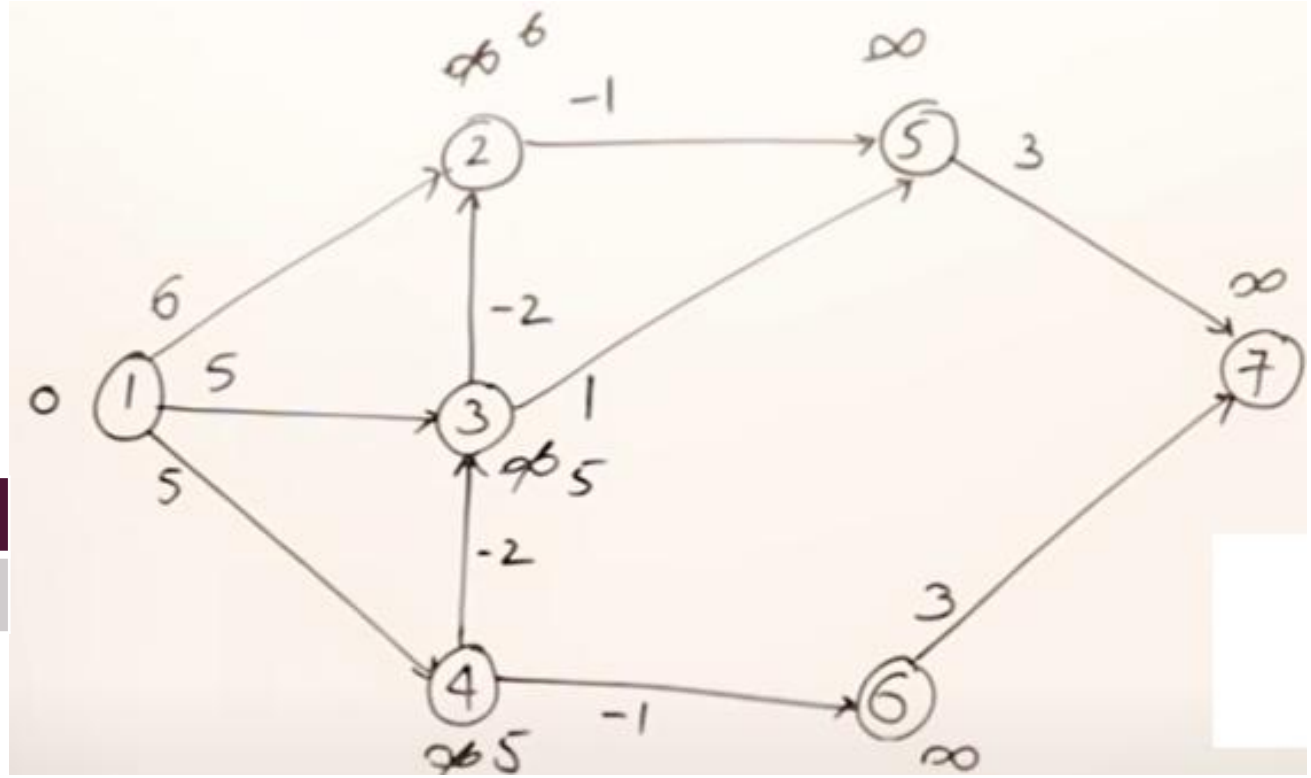
1	2	3	4	5	6	7
0	∞	∞	∞	∞	∞	∞



BELLMAN FORD ALGORITHM
RELAX THE EDGES (1,2)(1,3)(1,4)(2,5)(3,2)(3,5)(4,3)(4,6)(5,7)(6,7)

- Start vertex : 1

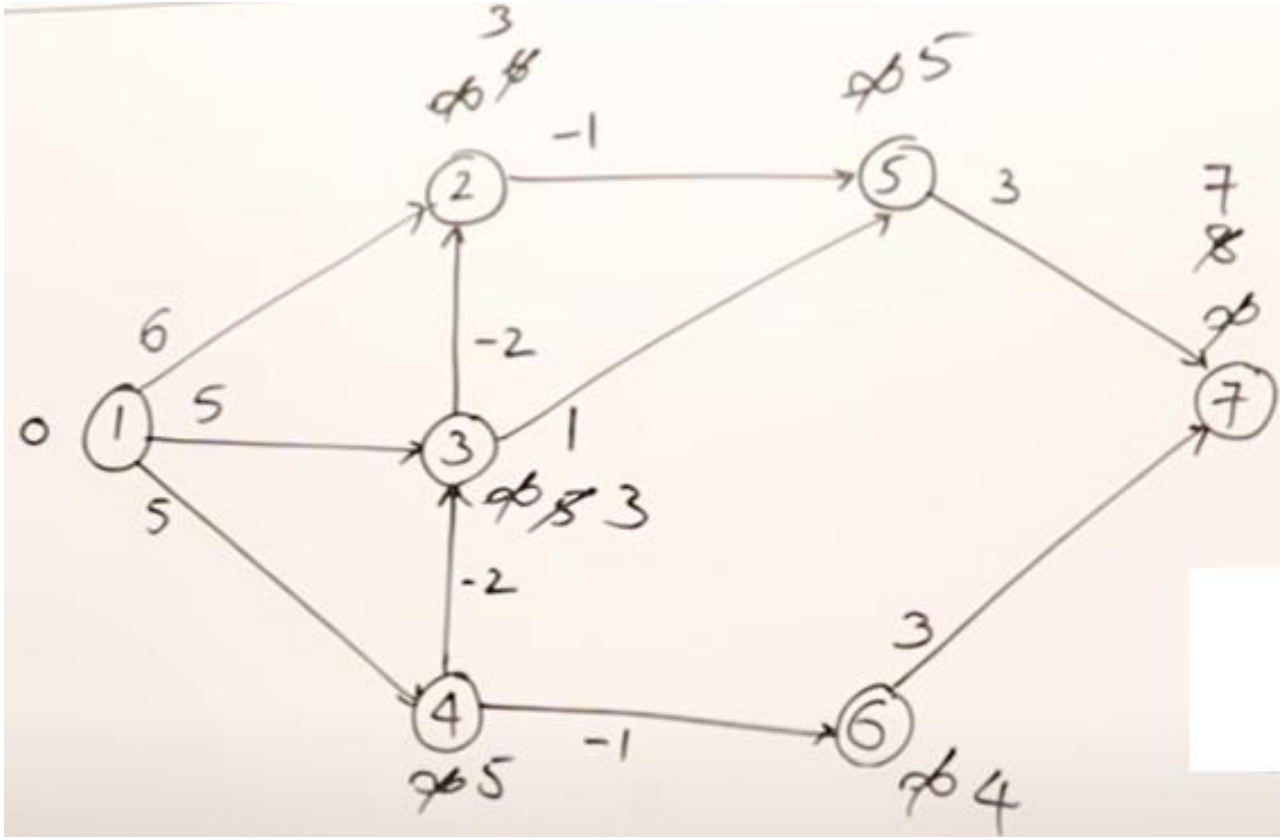
1	2	3	4	5	6	7
0	6	5	5	∞	∞	∞



BELLMAN FORD ALGORITHM
RELAX THE EDGES (1,2)(1,3)(1,4)(2,5)(3,2)(3,5)(4,3)(4,6)(5,7)(6,7)

- Start vertex : 1

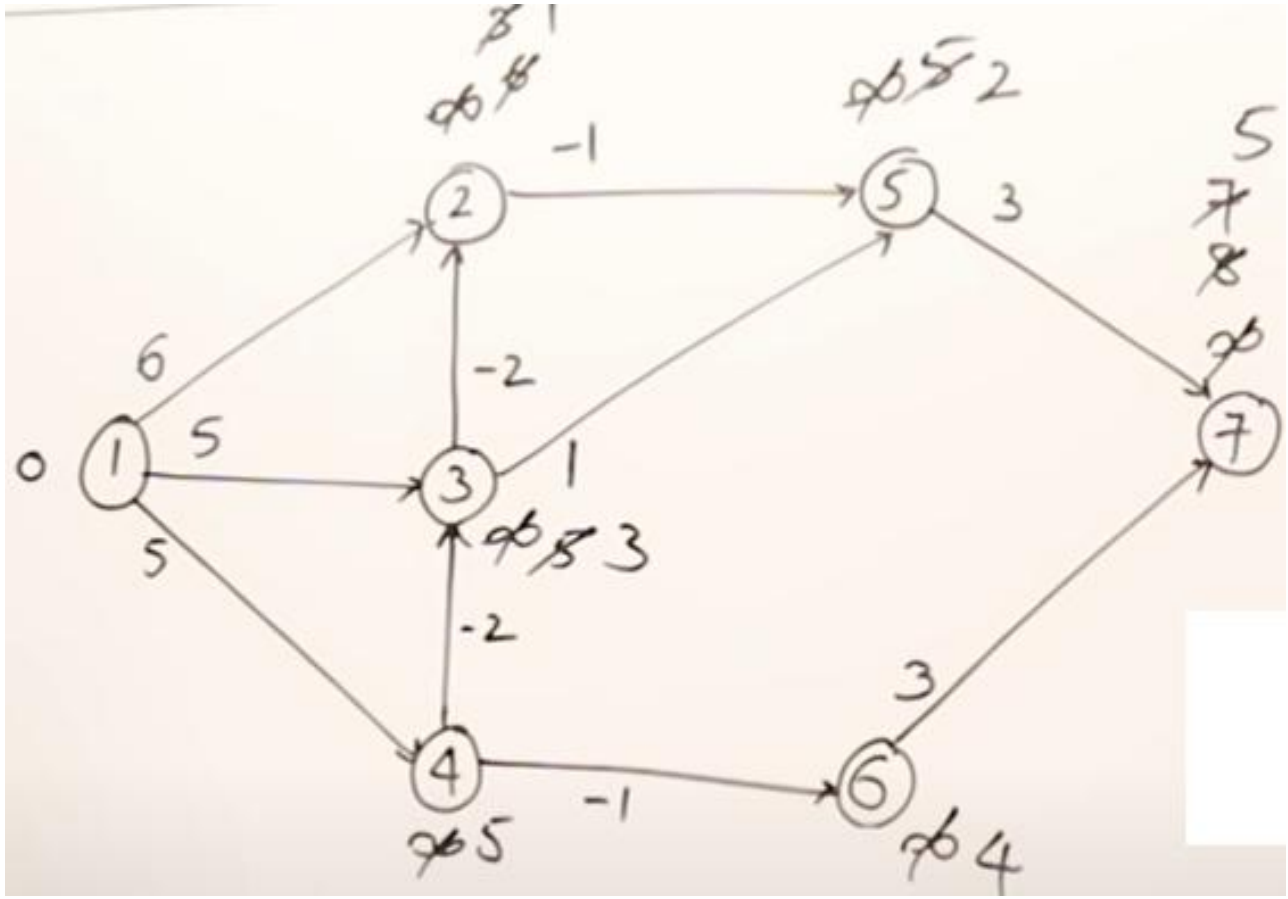
1	2	3	4	5	6	7
0	3	3	5	5	4	7



BELLMAN FORD ALGORITHM
RELAX THE EDGES (1,2)(1,3)(1,4)(2,5)(3,2)(3,5)(4,3)(4,6)(5,7)(6,7)

- After 2nd visit.

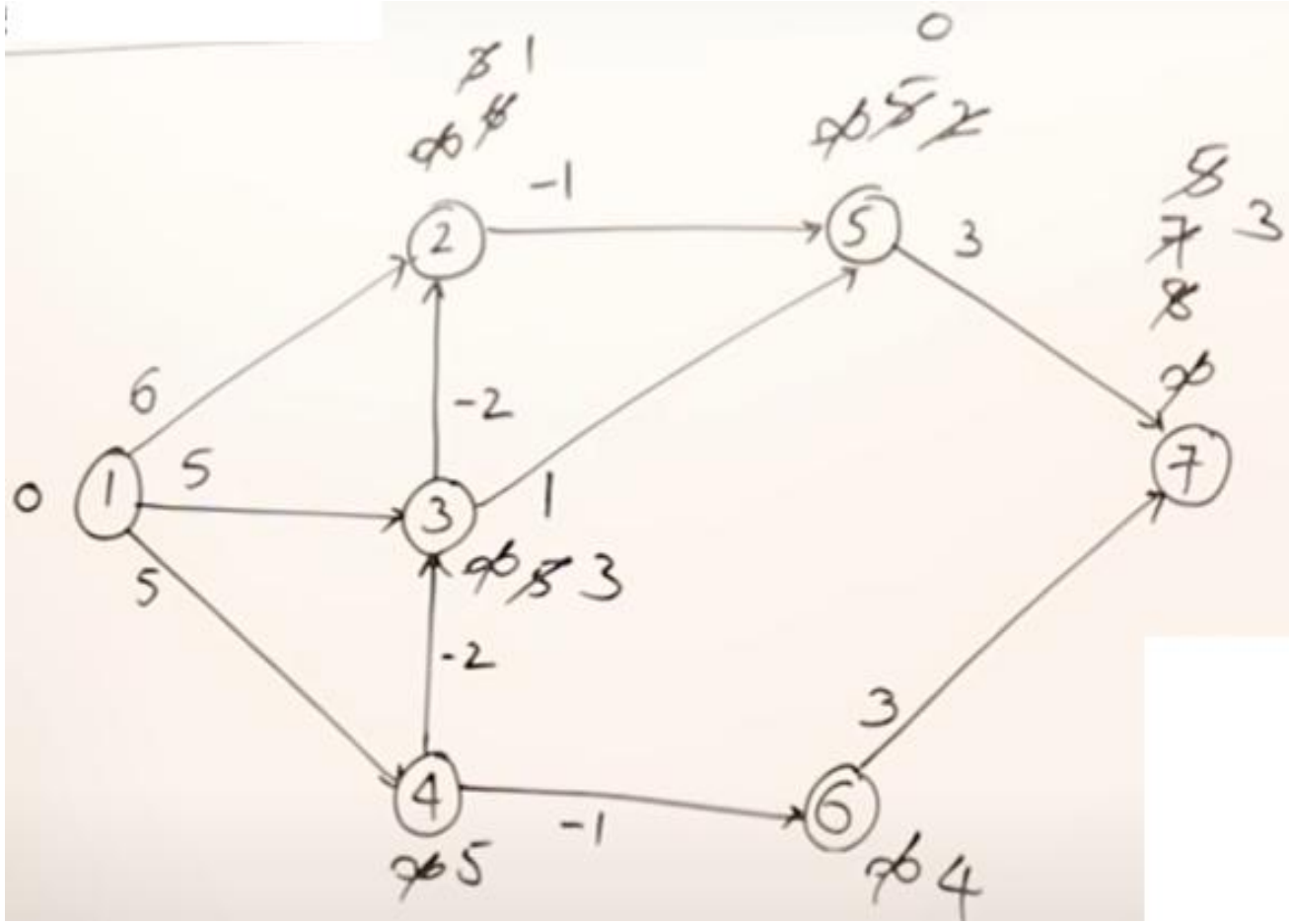
1	2	3	4	5	6	7
0	1	3	5	2	4	5



BELLMAN FORD ALGORITHM
RELAX THE EDGES (1,2)(1,3)(1,4)(2,5)(3,2)(3,5)(4,3)(4,6)(5,6)(6,7)

- After 3rd visit.

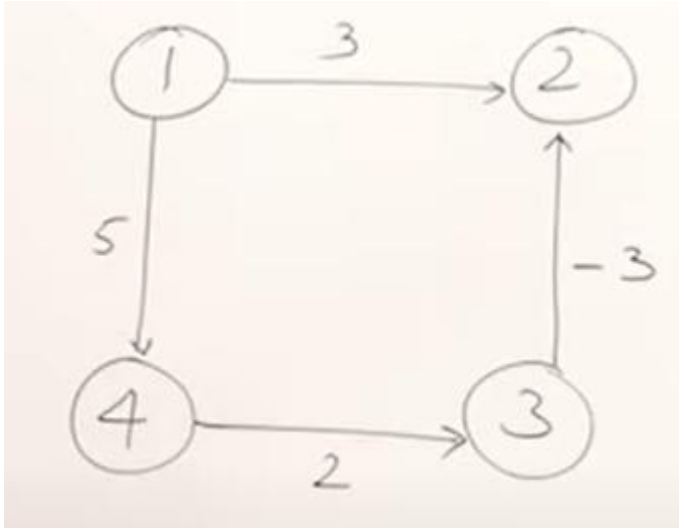
1	2	3	4	5	6	7
0	1	3	5	0	4	3

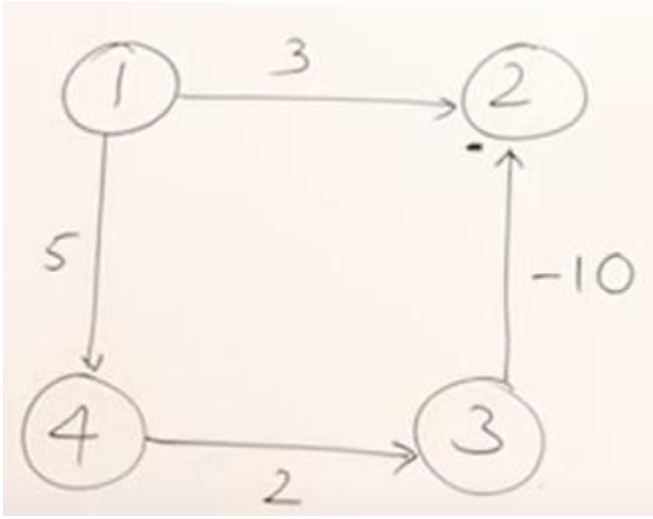


BELLMAN FORD ALGORITHM ANALYSIS

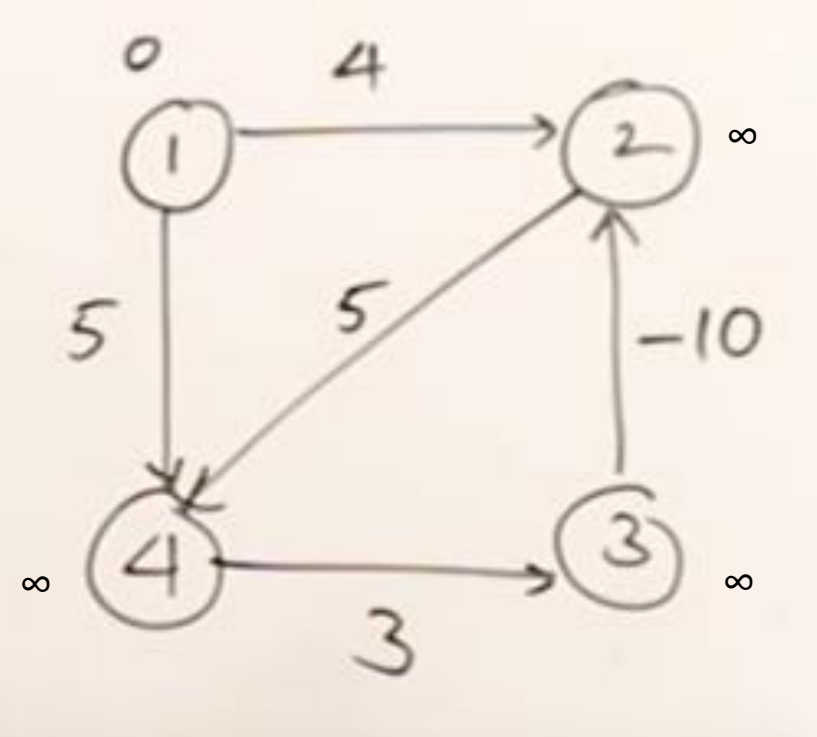
- (|V|-1) E → O(|V||E|) → O(n^2)
- For complete Graph E= n(n-1)/2 ……O(|V||E|) → O(n^3)

BELLMAN FORD ALGORITHM





BELLMAN FORD ALGORITHM
(1,2)(1,4)(2,4)(3,2)(4,3)



|V|-1

After 3rd time visit

1	2	3	4
0	-2	6	3

NEGATIVE WEIGHT CYCLE

NEXT CLASS

- Travelling Salesman Problem.