Chapter 3 :-

Greedy Method Approach

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* Introduction :-

- Greedy method finds out of many options, but you have to choose the best option.
- In this method, we have to find out the best method/option out of many present ways.
- In this method we focus on the first stage and decide the output, don't think about the future.

* Feasible Solution :-

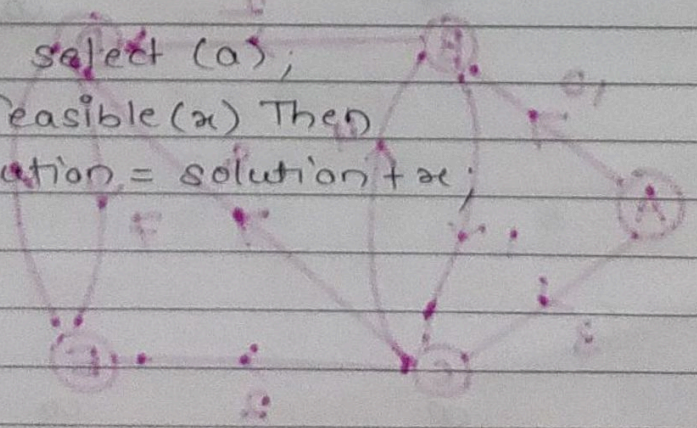
- A feasible solution is a set of values for the decision variables that satisfies all of the constraints in an optimization problem.

* Optimal solution :-

- An optimal solution is a feasible solution where the objective function reaches its maximum (or minimum) value - for example most profit and least cost.

* General method :-

```
Algorithm Greedy(a,n)
{
  for i = 1 to n do
  {
     x = select (a);
     if feasible(x) Then
       solution = solution + x;
  }
}
```



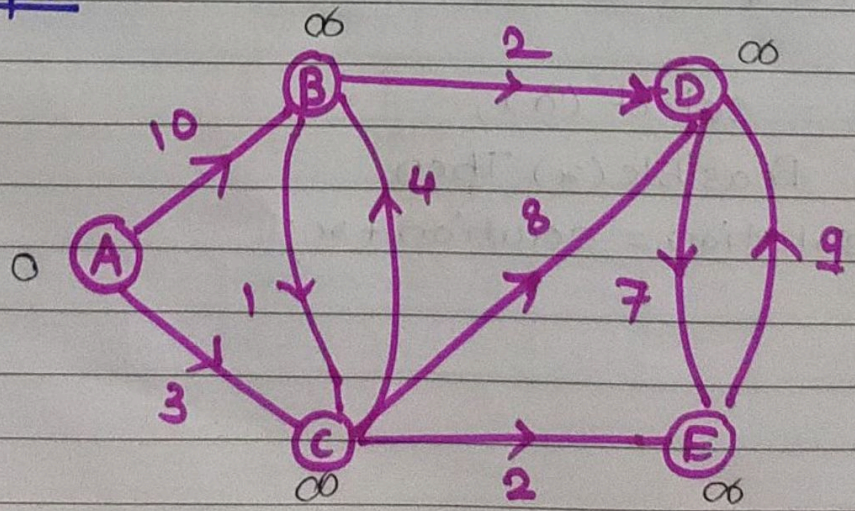
* Dijktra's Algorithm :-

```
Dijktra (G, W, S)
    Initial_single_source (G, S)
    S ← ϕ
    Q ← V[G]
    While Q ≠ ϕ
      do u ← Extract_Min(Q)
         S ← S ∪ {u}
        for each vertex v ← adj[u]
    do Relax (u, v, w)

Initial_single_source (V, S)
    for each u ∈ V
        do d[v] ← ∞
        pred[v] ← NiL
         d[s] ← 0

Relax (u, v, w)
    if (d[v] > d[u] + w(u,v)) then
         d[v] ← d[u] + w(u,v)
         pred [v] ← u
```

* Example :-



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Step 1:-

$S = \{ A$

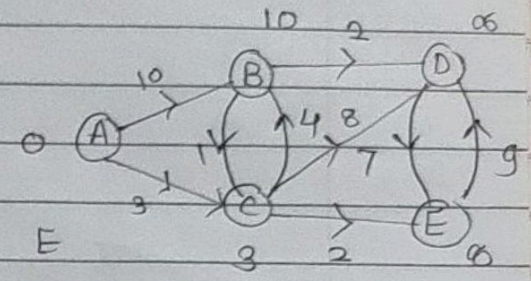
pred[v] :-

Q :	A	B	C	D	E
	[0]	∞	∞	∞	∞

Step 2:-

$S = \{ A, C$

pred[v] :- A A

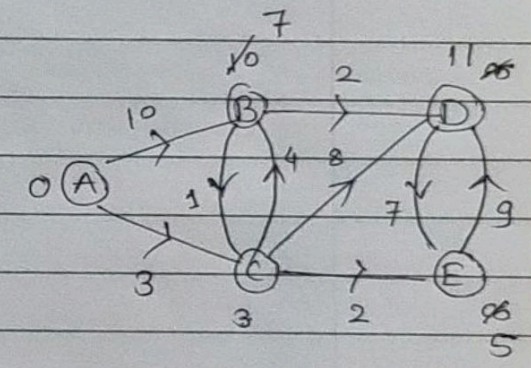


Q :	A	B	C	D	E
	0	∞	∞	∞	∞
		~~10~~ 10	[3]	∞	∞

Step 3:-

$S = \{ A, C, E$ (C)

pred[v] :- ~~A~~ A C C



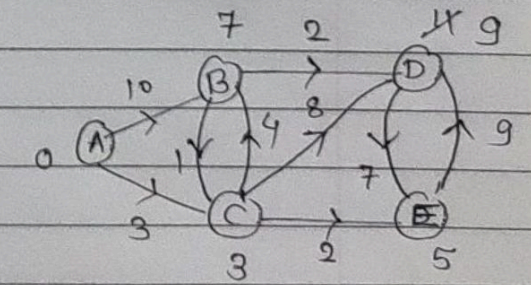
Q :	A	B	C	D	E
	[0]	∞	∞	∞	∞
		10	[3]	∞	∞
		7		11	[5]

Step 4:-

$S = \{ A, C, E, B, D \}$

C B

pred[v] :- ~~A~~ A ~~C~~ C C



Q :	A	B	C	D	E
	[0]	∞	∞	∞	∞
		10	[3]	∞	∞
	[7]			11	[5]
		[9]			

A → C → B → D

C → E