**Algorithm: Lab13 (By Sujiv Shrestha ID:610145)**

**Problem 1.**

1. Carry out the steps of Dijkstra's algorithm to compute the length of the shortest path between vertex V and vertex Y in the graph below. Your final answer should consist of three elements:

a) The length of the shortest path from V to Y

b) The list A[] which shows shortest distances between V and every other vertex

c) The list B[] which shows shortest paths between V and every other vertex



Step1: X←{V}

A[V] ←0

B[V] ←{}

Step2: X←{V}

Pool←{(V,W), (V,U), (V,X)}

Find minimum greedy length, min of the following

A[V]+wt(V,W) = 0+3 = 3

A[V]+wt(V,U) = 0+1 = 1

A[V]+wt(V,X) = 0+2 = 2

A[U]←1

X←{V,U}

B[U]←B[V]∪{(V,U)} = {(V, U)}

Step3: X←{V, U}

Pool←{(V,W), (V,X), (U,X), (U,Y), (U,W)}

Find minimum greedy length, min of the following

A[V]+wt(V,W) = 0+3 = 3

A[V]+wt(V,X) = 0+2 = 2

A[U]+wt(U,X) = 1+3 = 4

A[U]+wt(U,Y) = 1+2 = 3

A[U]+wt(U,W) = 1+4 = 5

A[X]←2

X←{V,U,X}

B[X] ←B[V]∪{(V,X)} = {(V, X)}

Step4: X←{V, U, X}

Pool←{(V,W), (U,Y), (U,W), (X,Y)}

Find minimum greedy length, min of the following

A[V]+wt(V,W) = 0+3 = 3

A[U]+wt(U,Y) = 1+2 = 3

A[U]+wt(U,W) = 1+4 = 5

A[X]+wt(X,Y) = 2+2 = 4

A[W]←3

X←{V,U,X,W}

B[W] ←B[V]∪{(V,W)} = {(V, W)}

Step5: X←{V, U, X, W}

Pool←{(U,Y), (X,Y)}

Find minimum greedy length, min of the following

A[U]+wt(U,Y) = 1+2 = 3

A[X]+wt(X,Y) = 2+2 = 4

A[Y]←3

X←{V,U,X,W,Y}

B[Y]←B[U]∪{(U,Y)} = {(V,U), (V, Y)}

Solution:

A[V]=0, A[U]=1, A[X]=2, A[W]=3, A[Y]=3

B[V]={}, B[U] = {(V, U)}, B[X] ={(V,X)}, B[W]={(V,W)}, B[Y]={(V,U),(V,Y)}

Shortest length between V and Y is = V-U-Y (distance = 3)