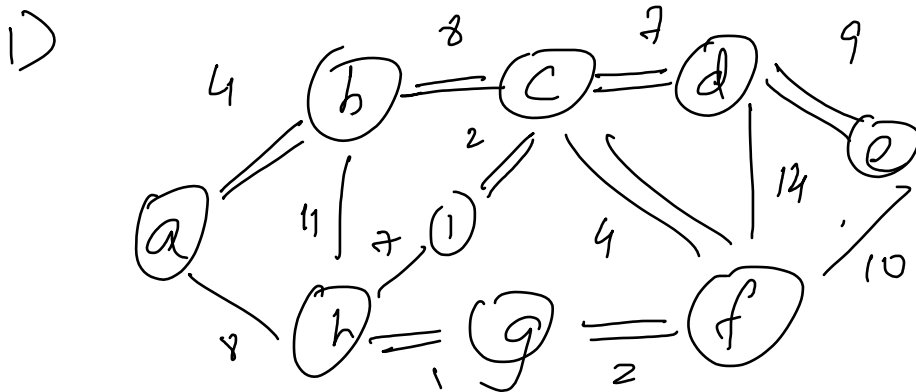Pranav Umakant Pujar (001965075

Design & Analysis of Algorithm   CSE - 53 11

Homework - 13 :

1)

Start at vertex a

Neighboring vertices are b, weight = 4
                        h, weight = 11

we choose 'b'

Next,

(b,c) = 8   Minimum = 8
(b,h) = 11   add h to visited set {a, b, h}
(a,h) = 8   MST edges = {(a,b):4, (ah):8}

Next:

$(h,f) = 6$

$(h,g) = 1$

$(b,c) = 8$

$(b,h) = 11$

Min $= (h,g) = 1$

Add g to visited set $= \{a, b, h, g\}$

MST edges $= \{(a,b): 4, (a,h): 8, (h,g): 1\}$

Next:

$(g,f) = 2$

$(g,i) = 2$

$(h,f) = 6$

$(b,i) = 8$

Min $= (g,f) = 2$

Add f to visited $= \{a, b, h, g, f\}$

MST edges $= \{(a,b): 4, (a,h): 8, (h,g): 1,$

$(g,f): 2\}$

Next step:

$(g,i) = 2$

$(f,c) = 4$

$(b,c) = 8$

Min $= (g,i) = 2$

Add i to visited $= \{a, b, h, g, f, i\}$

MST edges $= \{$ " " $, (g,i): 2\}$

Next step:

$(f,c) = 4$

$(b,c) = 8$

$(d,f) = 14$

$(f,e) = 10$

Min $= (f,c) = 14$

Add c to visited $= \{a, b, h, g, f, i\}$

MST edges $= \{$ " " $, (f,c): 4\}$

Next step:

$(c,d) = 7$ $\qquad$ Min $= (c,d) = 7$

$(d, f) = 14$ $\qquad$ Add d to visited $= \{a, b, h, g, f, c, d\}$

$(f,e) = 10$ $\qquad$ MST edges $= \{ ^{"} \quad ^{"}, (c,d): 7 \}$

Total weight $= 4 + 8 + 1 + 2 + 2 + 4 + 7 = \underline{\underline{28}}$

$\boxed{\text{Total weight} = 28}$

2) a) Start at a,

— visit all adjacent vertices of 'a': b, h

— visit all unvisited vertices of 'b': c

— $^{"}$ of 'h': f, g

— $^{"}$ of 'c': d

— $^{"}$ of 'f': none (all visited)

— $^{"}$ of 'g': none (all visited)

— $^{"}$ of 'd': e

Total BFS traversal order:

$a \to b \to h \to c \to f \to g \to d \to e$

b) start at source 'a'.
 — go to unvisited neighbor 'b'
 - go to unvisited neighbor 'c'
 — " " 'd'
 — " " 'e'

 - backtrack to 'a'

 - go to unvisited neighbor 'h'
 — " " 'g'
 — " " 'f'

 - Final DFS traversal order: —

 $a \to b \to c \to d \to e \to h \to g \to f$

Ex. 22.2-1) start at vertex 3 = $d[3] = 0,$
$\Pi(3) = none.$

vertex 5 and 6 are differently reachable from 3,
to the distance d and predecessor Π values for

each vertex are: —
vertex 1 : $d[1] = \infty,$ $\Pi(1) = None$
vertex 2: $d[2] = \infty,$ $\Pi(2) = none$
vertex 3: $d[3] = 0,$ $\Pi(3) = none$
vertex 4: $d[4] = \infty,$ $\Pi(4) = none$
vertex 5: $d[5] = 1$, $\Pi(5) = 3$
vertex 6: $d[6] = 1,$ $\Pi(6) = 3$