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Q2 Find the shortest path between a-z for the graph below using Dijkshtra's algorithm

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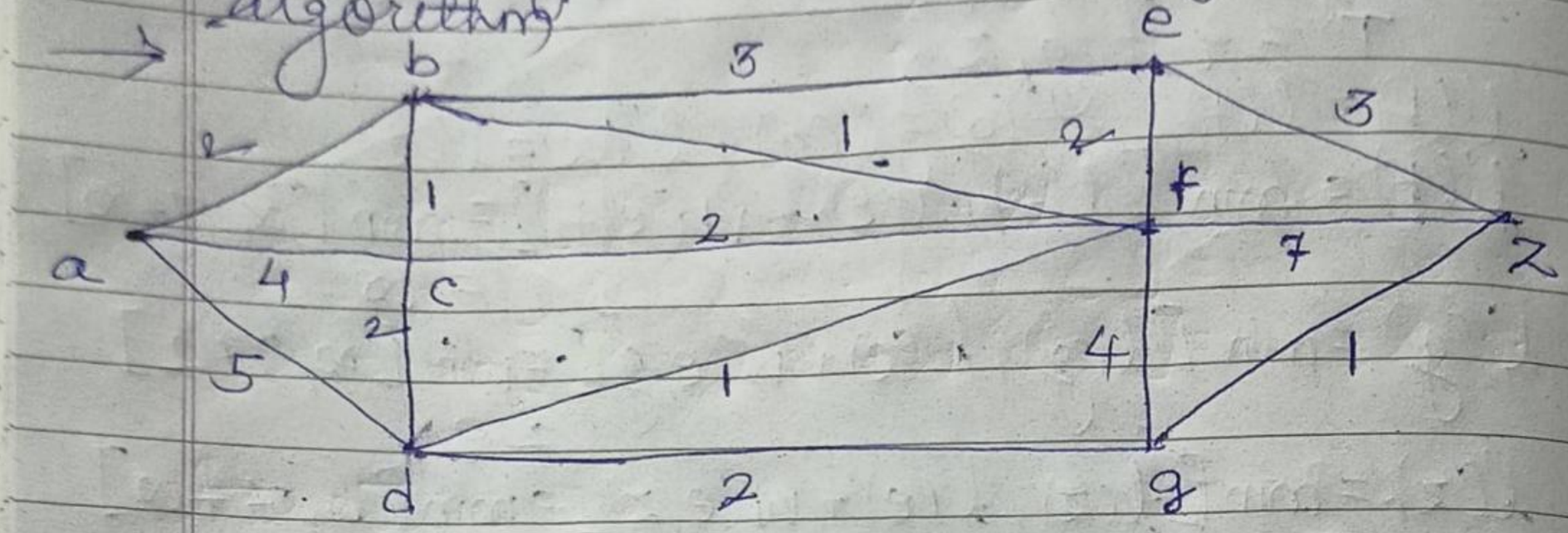

$P = \{a\}$

$T = \{b, c, d, g, f, e, z\}$

$l(b) = w(a,b) = 2$
$l(c) = w(a,c) = 4$
$l(d) = w(a,d) = 5$
$l(g) = w(a,g) = \infty$
$l(f) = w(a,f) = \infty$
$l(e) = w(a,e) = \infty$
$l(z) = w(a,z) = \infty$

iteration 1:

$l(b)$ has the lowest index.

$P' = \{a, b\}$

$T' = \{c, d, g, f, e, z\}$

$l'(c) = \min[l(c), l(b) + w(b,c)] = \min[4, 2+1] = 3$
$l'(d) = \min[l(d), l(b) + w(b,d)] = \min[5, 2+\infty] 5$
$l'(g) = \min[l(g), l(b) + w(b,g)] = \min[\infty, 2+\infty] = \infty$
$l'(f) = \min[l(f), l(b) + w(b,f)] = \min[\infty, 2+1] = 3$
$l'(e) = \min[l(e), l(b) + w(b,e)] = \min[\infty, 2+3] = 5$
$l'(z) = \min[l(z), l(b) + w(b,z)] = \min[\infty, 2+\infty] = \infty$

Iteration 2:

$l(c)$ has lowest index.

$P' = \{a, b, c\}$

$T' = \{d, g, f, e, z\}$

$l'(d) = \min[l(d), l(c) + w(c,d)] = \min[5, 3+2] = 5$

$l'(g) = \min[l(g), l(c) + w(c,g)] = \min[\infty, 3+\infty] = \infty$

$l'(f) = \min[l(f), l(c) + w(c,f)] = \min[\infty, 3+2] = 5$

$l'(e) = \min[l(e), l(c) + w(c,e)] = \min[\infty, 3+\infty] = \infty$

$l'(z) = \min[l(z), l(c) + w(c,z)] = \min[\infty, 3+\infty] = \infty$

iteration 3:

$l(f)$ has lowest index:

$p' = \{a, b, c, f\}$

$T' = \{d, g, e, z\}$

$l'(d) = \min[l(d), l(f) + w(d, f)] = \min[5, 5+1] = 5$

$l'(g) = \min[l(g), l(f) + w(g, f)] = \min[\infty, 5+4] = 9$

$l'(e) = \min[l(e), l(f) + w(f, e)] = \min[\infty, 5+2] = 7$

$l'(z) = \min[l(z), l(f) + w(f, z)] = \min[\infty, 5+7] = 12$

iteration 4:

$l(d)$ has lowest index.

$P' = \{a, b, c, d, f\}$

$T' = \{g, e, z\}$.

$l'(g) = \min[l(g), l(d) + w(d, g)] = \min[\infty, 5+2] = 7$

$l'(e) = \min[l(e), l(d) + w(d, e)] = \min[\infty, 5+\infty] = \infty$

$l'(z) = \min[l(z), l(d) + w(d, z)] = \min[\infty, 5+\infty] = \infty$

iteration 5:

$l(g)$ has the lowest index.

$P' = \{a, b, c, d, f, g\}$

$T' = \{e, z\}$

$l'(e) = \min[l(e), l(g) + w(g, e)] = \min[\infty, 7+\infty]$
$= \infty$

$l'(z) = \min[l(z), l(g) + w(g, z)] = \min[\infty, 7+1]$
$= 8$

iteration 6:

$l(z)$ has lowest index.

$P' = \{a, b, c, d, f, g, z\}$

$T' = \{e\}$

$l'(e) = \min[l(e), l(z) + w(z, e)] = \min[\infty, 8+3]$
$= 11$.

∴ Minimum distance between path a-e is 11.

∴ The shortest path is $\{a, b, c, f, d, g, z, e\}$