Part B

1.

a) distance between nodes = 30 m

data rate = 100×10^6 bps

frame size = 1×10^3 bit

t (frame transmission time) = b/m = $(1 \times 10^3) / (1 \times 10^8) = 1 \times 10^{-5}$ s

T (propogation delay btw nodes) = L/s = $30 / 3 \times 10^8 = 1 \times 10^{-7}$ s

$T/t = (1 \times 10^{-7}) / (1 \times 10^{-5}) = 0.01$

max useful utilization in CSMA for T/t = 0.01 is 81.5% &
max useful utilization in ALOHA for T/t = 0.01 is 18.4% &
for slotted ALOHA is 36.8%, ∴ CSMA more appropriate.

b) d = 300m

data rate = 1×10^{10} bps

frame size = 4×10^3 bit

t (frame transmission time) = b/m = $(4 \times 10^3) / (1 \times 10^{10}) = 4 \times 10^{-7}$

T (propogation delay btw nodes) = L/s = $300 / 3 \times 10^8 = 1 \times 10^{-6}$

$T/t = (1 \times 10^{-6}) / (4 \times 10^{-7}) = 2.5$

∴ CSMA would be more appropriate

2.

a)

	N	D(a)	D(b)	D(c)	D(d)	D(f)	D(g)	D(h)
Initialization	{e}	∞	8	∞	2	6	2	∞
1st iteration	{d,e}	∞	4	∞	2	5	2	∞
2nd iteration	{d,e,g}	∞	4	8	2	5	2	3
3rd iteration	{d,e,g,h}	∞	4	8	2	4	2	3
4th iteration	{d,e,f,g,h}	∞	4	8	2	4	2	3
5th iteration	{b,d,e,f,g,h}	7	4	5	2	4	2	3
6th iteration	{b,c,d,e,f,g,h}	6	4	5	2	4	2	3

b)

	$D^a(e)$	$D^b(e)$	$D^c(e)$	$D^d(e)$	$D^f(e)$	$D^g(e)$	$D^h(e)$
Initially	6	4	5	2	4	2	3
after 1 Exchange	6	4	5	2	7	2	3
after 2 Exchanges	6	4	5	2	5	2	6
after 3 Exchanges	6	4	5	2	5	7	6
No change	6	4	5	2	5	7	6