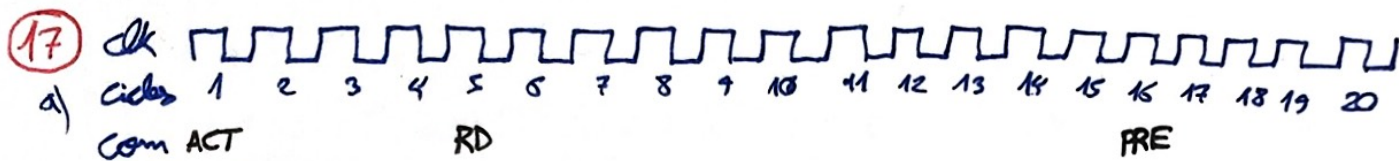


# Sessió 9: Q. 17, 18 ← Tema 3



b)  $T_c = \frac{1}{200 \cdot 10^6} = 5 \cdot 10^{-9} \text{ s} = 5 \text{ ns} \rightarrow 85 \text{ ns}$

c) Ample de Banda teòric màx =  $\frac{64 \text{ B} \cdot 200 \cdot 10^6 \text{ Hz}}{8 \text{ c}} = 1.6 \cdot 10^9 \text{ B/s} = 1.6 \text{ GB/s}$

d) Ample de Banda real =  $\frac{64 \text{ B} \cdot 200 \cdot 10^6 \text{ Hz}}{17 \text{ c}} = 752.94 \cdot 10^6 \text{ B/s} = 752.94 \text{ MB/s}$

e)  $V = 1.5 \text{ V}$  Mem. inactiva  $\Rightarrow I_{\text{de fuga}} = 200 \text{ mA}$

Des de ACT a PRE + 100 mA Transferrència de dades + 500 mA (\*)

$P_T = P_1 + P_2 + P_3 = 0.642 \text{ W}$

(\*)  $P_1 = 1.5 \text{ V} \cdot 300 \cdot 10^{-3} \cdot \frac{7+2}{25} = 0.162 \text{ W}$

$P_2 = 1.5 \text{ V} \cdot 800 \cdot 10^{-3} \cdot \frac{8}{25} = 0.384 \text{ W}$

$P_3 = 1.5 \text{ V} \cdot 200 \cdot 10^{-3} \cdot \frac{8}{25} = 0.096 \text{ W}$

$P = \frac{E}{t}$ ;  $E = P \cdot t = 0.642 \text{ W} \cdot (100 \cdot 5 \cdot 10^{-9}) = 3.21 \cdot 10^{-7} \text{ J}$

g) DDR  $\rightarrow$  El mateix que abans però ara en comptes de 8 B/c són 16 B/c. Transmissió durarà 4 c i la lectura 13 c.

18) a)  $T_c = 10 \text{ ns}$   
 $N = 5 \cdot 10^9 \text{ inst.}$   
 $\text{CPI ideal} = 1.8 \text{ c/c}$

$T_{\text{exe}} = N \cdot \text{CPI} \cdot T_c = 90 \text{ ns}$

b) Accessos tantos com instruccions  $\rightarrow 5 \cdot 10^9$  accessos.

c)  $t_{\text{pf}} = 13 \text{ c}$  d)  $T_{\text{ma}} = t_{\text{ext}} + t_{\text{acc mem}} \cdot t_{\text{pf}} = 1 + 0.1 \cdot 13 = 2.3 \text{ c}$   
 $2.3 \text{ c} \cdot 10 \cdot 10^{-9} = 23 \text{ ns}$

e) ①  $\text{CPI} = \text{CPI ideal} + \text{CPI mem} = 1.8 + 1 \cdot 0.1 \cdot 13 = 3.1 \text{ c/c}$

②  $\text{Cicles} = \text{Cicles ideal} + \text{Cicles mem} = \frac{90}{10 \cdot 10^{-9}} + 5 \cdot 10^9 \cdot 0.1 \cdot 0.3 = 1.55 \cdot 10^{10}$

$\text{CPI} = \frac{1.55 \cdot 10^{10}}{5 \cdot 10^9 \text{ inst}} = 3.1 \text{ c/c}$

f)  $T_{\text{exe}} = N \cdot \text{CPI} \cdot T_c = 155 \text{ ns}$

g)  $0.1 \cdot 0.7 = 0.07 \rightarrow 7\%$  h)  $0.1 \cdot 0.3 = 0.03 \rightarrow 3\%$

i)  $t_{\text{pf}} = 5 \text{ cicles}$  j)  $t_{\text{pf}} = 15 \text{ cicles}$  k)  $\text{CPI} = \text{CPI ideal} + \text{CPI mem} = 1.8 + 5 \cdot 0.1 \cdot 1 = 2.3$

m)  $T_{\text{exe}} = N \cdot \text{CPI} \cdot T_c = 5 \cdot 10^9 \cdot 2.3 \cdot 10 \cdot 10^{-9} = 115 \text{ ns}$  n)  $\text{speed-up} = \frac{155}{115} = 1.35$