

1. 11) 5级流水线化后, 时钟周期要取最长延时, 再加上  $0.1ns$ ,  
因此,  $T_5 = 2.1ns$ .

$$12) S = \frac{T_{pipe}}{T_{cycle}} \times \frac{CPI_{pipe}}{CPI_{cycle}} = \frac{2.1}{7} \times \frac{N+5-1}{N} \quad \text{当 } N \gg 4 \text{ 时}$$
$$S \approx 0.3 \quad \therefore \text{加速比为 } 3.3$$

$$13) S = \frac{T_{pipe}}{T_{cycle}} \times \frac{N+k-1}{N}$$

当  $k \rightarrow \infty$  时, 显然  $S \rightarrow \infty$ , 因此加速比极限并不在  $k \rightarrow \infty$  时取到.

$$S = \frac{k+0.1}{7} \times \frac{N+k-1}{N} \quad \text{在 } N \gg k-1 \text{ 基础上,}$$

才有  $S_{min} = \frac{1}{70} \quad \therefore \text{加速比}_{max} = 70$ .