تمرین ۱ معماری کامپیوتر اشکان شکیبا ۹۹۲۱۰۳۰

۱)

$$CPI = 1\times\frac{15}{100} + 1\times\frac{15}{100} + 2\times\frac{40}{100} + 3\times\frac{20}{100} + 5\times\frac{10}{100} = 2.2$$

$$MIPS = \frac{F}{CPI}\times 10^{-6} = \frac{300\times 10^{6}\times 10^{-6}}{2.2} = 136.36$$

۲)

$$performance = \frac{1}{response\ time}, \quad response\ time = \#\ of\ instructions \times CPI \times T$$

$$\frac{P_{جدید}}{P_{قدیم}} = \frac{f_{قدیم}}{f_{جدید}} = \frac{1\times 1\times 1}{0.9\times 1.1\times 1} = 1.052$$

$$P_{قدیم} = \frac{1}{15} \Rightarrow P_{جدید} = 1.052\times\frac{1}{15} = 0.10$$

۳)

$$CPI_1 = 1\times\frac{5}{7} + 2\times\frac{1}{7} + 3\times\frac{1}{7} = \frac{10}{7}$$

$$CPI_2 = 1\times\frac{10}{12} + 2\times\frac{1}{12} + 3\times\frac{1}{12} = \frac{15}{12}$$

$$MIPS_1 = \frac{F}{CPI_1}\times 10^{-6} = \frac{500\times 10^{6}\times 10^{-6}}{\frac{10}{7}} = 350$$

$$MIPS_2 = \frac{F}{CPI_2}\times 10^{-6} = \frac{500\times 6^{6}\times 10^{-6}}{\frac{15}{12}} = 400$$

$$\Rightarrow MIPS_2 > MIPS_1$$

response time$_1$ $= (5 \times 1 + 1 \times 2 + 1 \times 3) \times T = 10\,T$

response time$_2$ $= (6 \times 1 + 1 \times 2 + 1 \times 2) \times T = 10\,T$

$\Rightarrow$ response time$_1$ $<$ response time$_2$

response time $=$ # of instructions $\times$ CPI $\times$ T (۲۰

$$\Rightarrow \frac{10}{8} = \frac{1 \times CPI_1 \times \frac{1}{2200}}{1 \times 1.2 CPI_1 \times \frac{1}{F}} = \frac{F}{1.2 \times 2200} \Rightarrow F = 2640\ MHz$$