Q1

①

Execution time$_B$ = 6 days
$$= 518400 \, \text{Sec}$$

Factor, $N = 3$

$$T_{\text{affected}} = (518400 \times 0.7) \, \text{Sec}$$
$$= 362880 \, \text{Sec}$$

$$T_{\text{unaffected}} = (518400 - 362880) \, \text{Sec}$$
$$= 155520 \, \text{Sec}$$

Execution time$_{Bnew}$ = $\dfrac{T_{\text{affected}}}{3} + T_{\text{unaffected}}$

$$= \frac{362880}{3} + 155520$$

$$= 276480 \, \text{Sec}$$

② Execution time$_A$ = 4 days = 345600 Sec

Reference time = 8 days = 691200 Sec

$$Spec_A = \frac{691200}{345600} = 2 \quad ; \quad Spec_B = \frac{691200}{276480} = 2.5$$

③ Geometric mean = $\sqrt{2 \times 2.5} = \sqrt{5}$

Q2

①

$$\text{Clock Cycles} = (5 \times 3.6 + 2 \times 1.7 + 3 \times 6.1 + 1 \times 4.1) \, 10^9$$

$$= 4.38 \times 10^{10}$$

$$\text{Avg. CPI} = \frac{\text{Clock Cycles}}{\text{Instruction Count}}$$

$$= \frac{4.38 \times 10^{10}}{(5+2+3+1) \, 10^9}$$

$$= 3.982$$

②

$$\text{CPU time} = \frac{\text{CPI} \times \text{IC}}{\text{Clock Rate}}$$

$$= \frac{3.982 \times 11 \times 10^9}{1.8 \times 10^6}$$

$$= 24334.44 \, \text{sec}$$

③

$$\text{SPEC Ratio} = \frac{\text{Reference Time}}{\text{Measured Time}}$$

$$= \frac{120 \times 10^{-9}}{24334.44} = 4.93 \times 10^{-12}$$

$$\text{Performance} = \frac{1}{\text{CPU time}} = \frac{1}{24334.44} = 4.11 \times 10^{-5}$$