we know that the amplitude decays over time as something like $\sim e^{-At}$.

in particular,

$$A(t) \equiv A = A_0 e^{-\frac{b}{2m}t},$$ ① correct equation

where $A(t)$ is the amplitude at time t, A_0 is the initial amplitude, b is the damping constant and m is the mass.

$$A = A_0 e^{-\frac{b}{2m}t}$$

$$\Rightarrow \quad b = \frac{2m}{t} \ln\left|\frac{A_1}{A_2}\right|$$

$$= \frac{2(0.0510)}{4.90} \ln\left|\frac{0.293}{0.112}\right|$$

$$= 0.0200 \text{ kg s}^{-1}$$ ① correct answer
① correct precision

the amplitude of a forced oscillator is

$$A = \frac{F_{max}}{\sqrt{(k - m\omega_d^2)^2 + b^2\omega_d^2}}$$

max value of driving force.

damping constant

mass

force constant of restoring force

driving angular frequency

when is A a maximum? near $\omega_d = \sqrt{\frac{k}{m}}$.

using the maximum value condition (aka resonance) such that

$$A_1 = \frac{F_{max}}{b\omega_d},$$

$\Rightarrow$ a) $A = \dfrac{F_{max}}{3b\omega_d} = \dfrac{A_1}{3}$

b) $A = \dfrac{F_{max}}{\frac{b}{2}\omega_d} = 2A_1$