A damped vibrating system starting from rest has a initial amplitude of 20cm which reduces to 2 cm after 100 complete oscillation each of period 2.303 scond. Find the logarithmic decrement of system? 0.023

Solution:

$\mathrm{N} = 100 -$ the number of oscillations;

$\mathrm{T} = 2.303\mathrm{s} -$ period of the oscillations;

$\mathrm{A}_1 = \mathrm{x(t)} = 0.2\mathrm{m} -$ initial amplitude;

$\mathrm{A}_{100} = \mathrm{x(t + N \cdot T)} = 0.02\mathrm{m} -$ amplitude after time $\mathrm{N \cdot T}$;

Formula for the logarithmic decrement of the system:

$$\delta = \frac{1}{\mathrm{N}} \ln\left(\frac{\mathrm{x(t)}}{\mathrm{x(t + N \cdot T)}}\right) = \frac{1}{100} \ln\left(\frac{0.2\mathrm{m}}{0.02\mathrm{m}}\right) = 0.023$$

Answer: logarithmic decrement of the system is $\delta = 0.023$