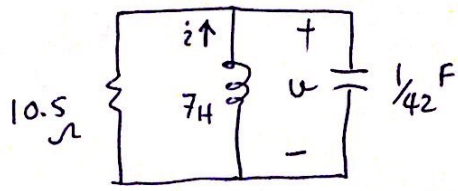
Graphical Representation of the Underdamped Response

(PP 340 8th Ed HKD)

For the parallel RLC cct

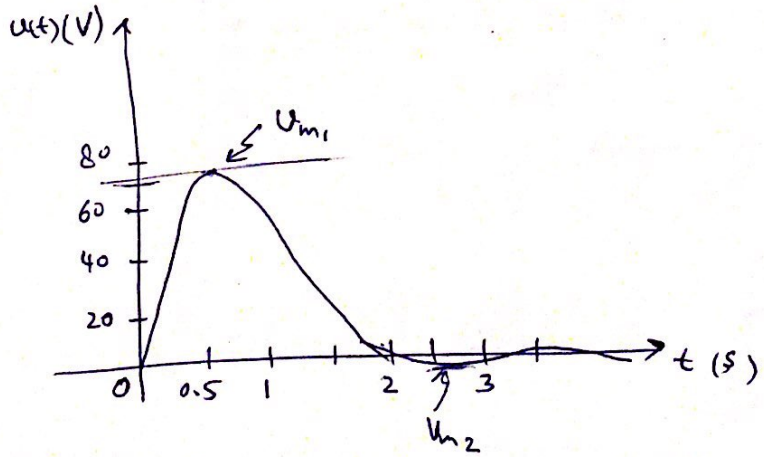


$v(0) = 0$

$i(0) = 10\ A$

$$v(t) = 210\sqrt{2}\, e^{-2t} \sin\sqrt{2}\,t$$

- the response function has an initial value of zero, because of the initial condition i.e $v(0) = 0$
- and a final value of zero because the exponential term vanishes for large values of t.
- The response curve can be drawn as:-



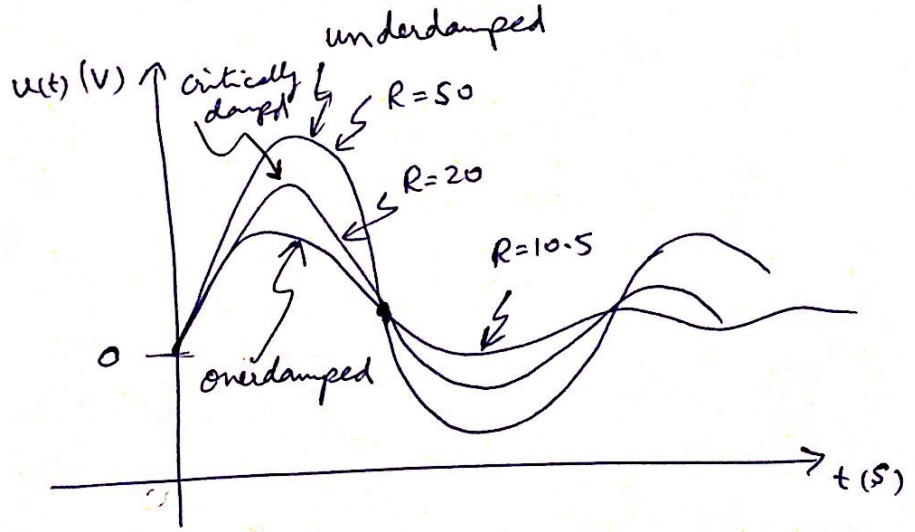
- In this example, the response is only slightly underdamped
- The oscillatory nature of the response becomes more noticeable as α decreases.

——— contd

— contd (341)

If $\alpha = 0$, which corresponds to $R \to \infty$, then $v(t)$ is an undamped sinusoid that oscillates with constant amplitude.

— The different values of R will yield:-



(Fig 9-15 Showing increase in oscillatory behaviour as R increases)