

Answers to Exercises

Chapter 5, exercise 4:

Recall that an LTI system can only change the amplitude and phase of a sinusoidal input, not the frequency or shape of the wave. Hence only systems 'M' and 'L' could be LTI, because system 'M' has amplified and phase-shifted the input sinusoid, whereas system 'L' has attenuated the input signal to an amplitude of zero. In other words, its *response* = $output/input = 0$. Systems 'J' and 'E' have an output at the same periodicity as the input, but they are no longer sinusoidal, whereas System 'G' has a sinusoidal output but at a different (higher) frequency.

Chapter 5, exercise 5:

System 'P' could be a simple amplifier in which all sinusoidal components are amplified by the same amount, hence preserving the exact shape of the input wave. System 'H' could have its *response* equal to 0 at the particular frequencies at which sinusoidal components are present in the input wave. System 'R' (the hard one!) could have its *response* equal to 0 at a range of frequencies, but not in the region of the 200 Hz, the fundamental frequency of the input wave (and the sinusoidal output here). If you can't follow this now, don't worry. It should all be clear to you by the end of Chapter 8!