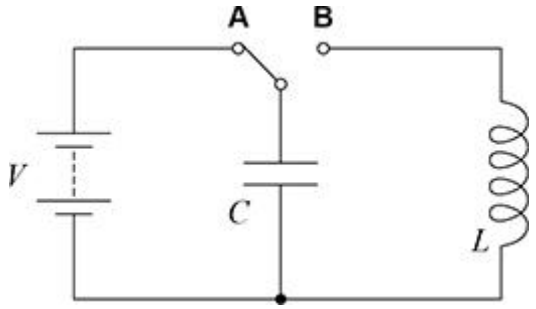
Q1.

Figure 1 shows an LC circuit that produces electrical oscillations when the switch is moved from position **A** to position **B**.

Figure 1



(a) Which quantity in the LC circuit is analogous to the mass in a mass–spring system?

Tick (✓) **one** box.

C ☐

$\frac{1}{C}$ ☐

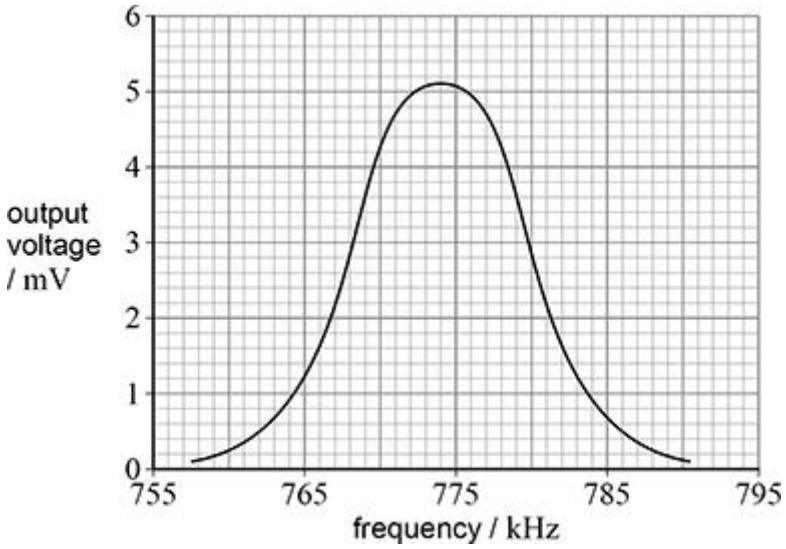
L ☐

$\frac{1}{L}$ ☐

(1)

(b) A radio receiver uses a parallel LC tuned circuit to select a radio station. **Figure 2** shows the response of the tuned circuit.

Figure 2



Calculate the quality factor Q of the tuned circuit.

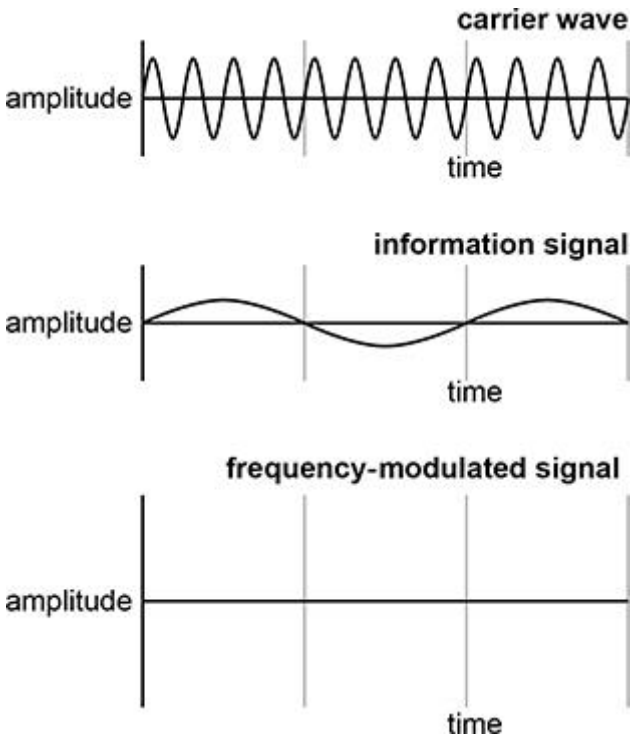
Q = _____

(3)

Another radio receiver is used to detect frequency-modulated (FM) radio waves.

Figure 3 shows the variation of amplitude with time for a carrier wave and an information signal.

Figure 3



(c) Sketch, on **Figure 3**, the graph that represents the frequency-modulated (FM) signal.

(2)

(d) An audio signal is transmitted on an FM music station. The transmission has a bandwidth of 186 kHz. The carrier wave has a maximum frequency deviation of 75 kHz.

Calculate the maximum frequency in the information signal.

maximum frequency = _____ kHz

(1)

(Total 7 marks)