2. (b) (i) A uniform bar AB of length 60 cm and weight 20 N is suspended by two springs 1 and 2. Spring 1 has a force constant of 30 Nm^{-1} while the force constant of spring 2 is 50 Nm^{-1}. Both springs have a length of 20 cm when they are not stretched. Spring 1 is attached to the end A of the bar and spring 2 is attached to a point on the bar at a distance x from end B of the bar as shown in Fig. 1. What is the value of x so that the bar can remain horizontal while in equilibrium?
[0.12 m]

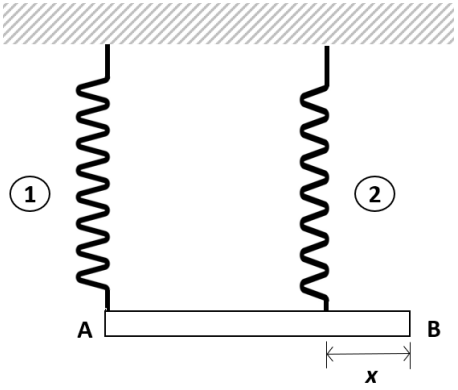

Fig. 1.

(ii) The two springs are now attached to two vertical walls at 50 cm apart. A small particle of mass 50g is attached to the free ends of both springs as shown in Fig. 2. The particle can move over a smooth horizontal surface between the two walls.

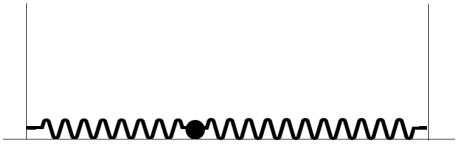
Fig. 2.

1. What are the lengths of both springs when the system is in equilibrium?
[Length of spring 1 and spring 2 are 0.2625 m and 0.2375 m respectively at equilibrium.]

2. If the particle is displaced through a small distance from the equilibrium position and released, what is the frequency of its oscillation?
[6.37 Hz]

[8 marks]

Note: Responses were graded based on erroneous values given in the original question. Corrections are in RED.