Q-1 The length of the uncompressed spring is 11.0 cm. The diameter of the wire used to make the spring has been measured using a micrometer screw gauge and has a value of 1.60 mm. The spring has twelve complete turns. When the spring is compressed, the coils are all touching. Calculate the length of the spring when it is fully compressed.

The length of the compressed spring is composed by the thickness of the wire. As there are 12 turns in the spring its length is equal to the 12 diameters of the wire and thus the length of the spring is

$$L = n * D = 12 * 1.6\, mm = 19.2\, mm = 1.92\, cm$$

Q-2 The energy stored in a spring compressed by a distance x is ½ kx^2, where k is the spring constant. Use the principle of conservation of energy to find the speed v at which the ball bearing leaves the compressed spring.

The compression in the spring is x hence the elastic potential energy stored in the spring will be ½ kx^2. When the spring is released this energy is converted to the kinetic energy of the ball bearing. Thus using law of conversion of energy we get

Gain in kinetic energy = loss in elastic potential energy

Or $\frac{1}{2}\, mv^2 = \frac{1}{2}\, kx^2$

Or $v^2 = \frac{k}{m}\, x^2$

Or $v = \sqrt{\frac{k}{m}}\, x$