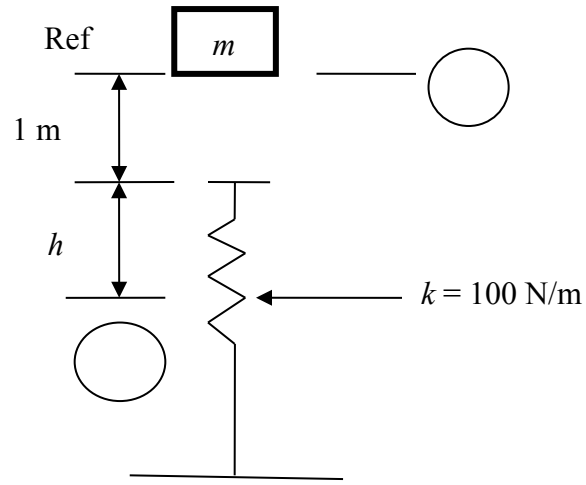
TOPIC

Engineering Mechanics (Statics and Dynamics) – Section VII – Question 18

QUESTION

A 10 kg block is released from rest at Position 1. Which of the following equations represents the reduced from of the conservation of energy necessary to find the maximum compression, h, in the spring at position 2?



(A) $0 = -98.1h - 98.1 - 50h^2$
(B) $0 = -98.1h + 50h^2$
(C) $0 = -98.1h - 98.1 + 50h^2$
(D) $0 = 98.1h + 98.1 + 50h^2$

HINT

(1) This is a conservation of mechanical energy (CME) problem.
(2) M.E. can be stated as:

$$\sum T_1 + \sum V_1 = \sum T_2 + \sum V_2$$

where
T_1= All kinetic energy at position 1
V_1= All potential energy at position 1
T_2= All kinetic energy at position 2
V_2= All potential energy at position 2

SOLUTION

$$\sum \boldsymbol{T_1} + \sum \boldsymbol{V_1} = \sum \boldsymbol{T_2} + \sum \boldsymbol{V_2}$$
$$\sum V_1 = 0$$

$$\sum T_2 = 0$$

Hence

$$0 = mgh + \frac{1}{2}k\delta^2$$

$$0 = -10(9.81)[1 + h] + \frac{1}{2}k(h)^2$$

(PE is negative as it falls below reference)

$$0 = -98.1 - 98.1h + \frac{1}{2}(100)(h)^2$$

$$0 = -98.1h - 98.1 + 50h^2$$

ANSWER

(C)

CONTRIBUTOR

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