

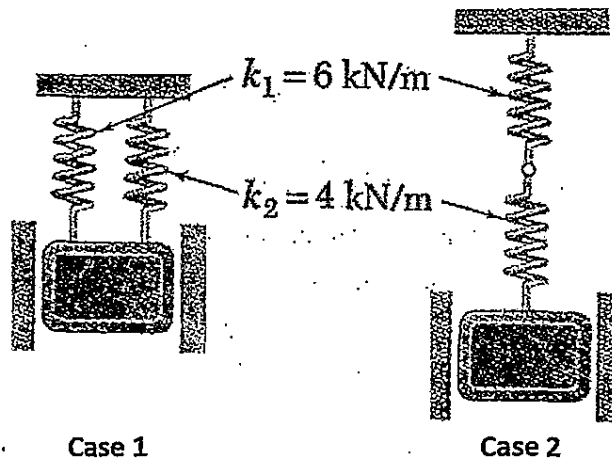
※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (25%) 請將以下中文句子翻譯成英文：

彈簧可用來吸收外來負載所造成的衝擊。彈簧的種類包含：螺旋壓縮彈簧、螺旋拉伸彈簧、板片彈簧、扭轉彈簧與扭力棒等。螺旋壓縮彈簧的無負載長度為不受外力作用時彈簧之長度，實體長度為彈簧壓縮至線圈無空隙時之長度，彈簧指數為平均直徑與線徑之比值，平均直徑為彈簧外徑與內徑之平均值。

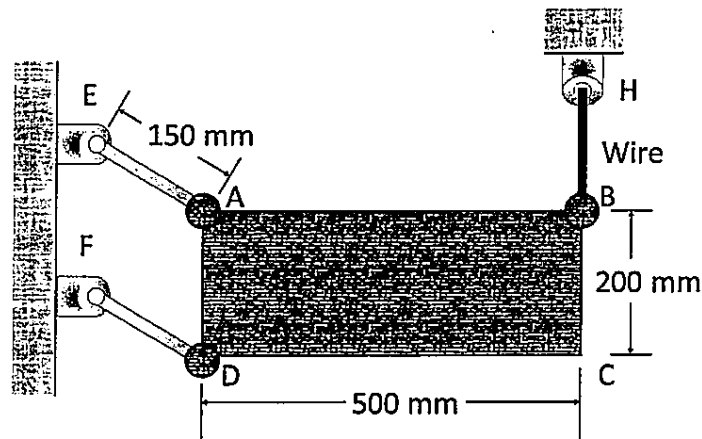
2. (25%) A 50-kg mass block moves between vertical smooth guides (friction can be ignored) as shown in the following figure. The block is pulled 50mm down from its equilibrium position and released. For each spring arrangement (Case 1 and Case 2 in the following figure), determine

- The period and natural frequency of the resulting vibration.
- The displacement of the mass block as a function of time.
- The maximum velocity, and maximum acceleration of the mass block.



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3. (25%) The thin plate ABCD of mass 8 kg is held in the position shown by the wire BH and two links AE and DF. Neglecting the mass of the links, determine immediately after wire BH has been cut (a) the acceleration of the plate, (b) the force in each link.



4. (25%) Each of the two slender rods shown is 0.75 m long and has a mass of 6 kg. If the system is released from rest with $\beta=60^\circ$, determine (a) the angular velocity of rod AB when $\beta=20^\circ$, (b) the velocity of point D at the same instant.

