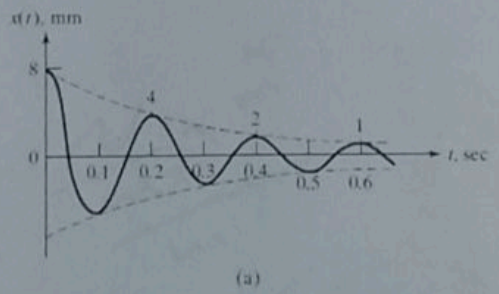
كلية الهندسة – جامعة مصراتة	الإمتحان النهائي ربيع 2023
إسم المقرر: اهتزازات ميكانيكية I رقم المقرر: هـ . مك 409	التاريخ :2023/07/10 ف
القسم : الهندسة الميكانيكية	الزمن : 3 ساعات

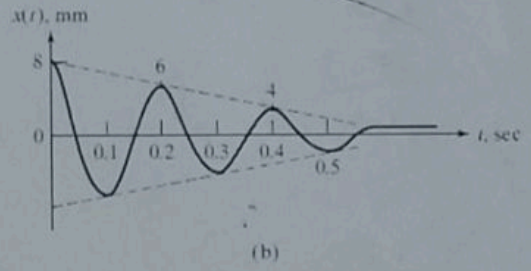
(10 points for each question)

1. A harmonic motion has a frequency of 10 cps and its maximum velocity is 4.57 m/s. Determine its amplitude, its period, and its maximum acceleration?

2. The free-vibration responses of an electric motor of weight 500 N mounted on different types of foundations are shown in Figs. 2.107(a) and (b). Identify the following;
   (i) the nature of damping provided by the foundation in each case,
   (ii) the spring constant and damping coefficient of the foundation in case (a),
   (iii) the undamped and damped natural frequencies of the electric motor in case (a).

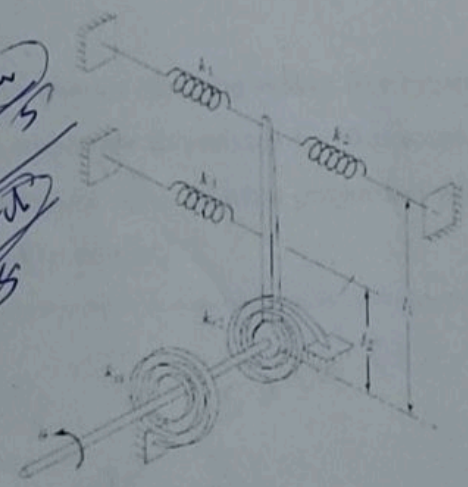


(a)

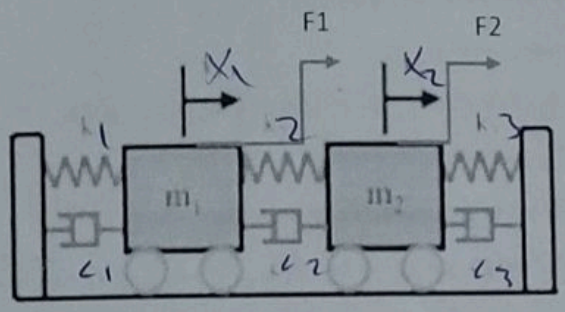


(b)

3. In the Figure below, find the equivalent spring constant of the system in the direction of θ?

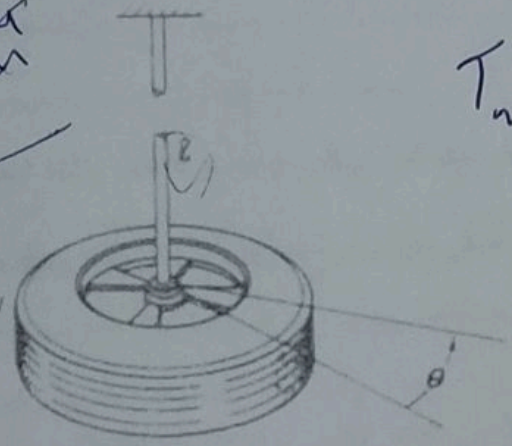


4. Derive the mathematical model of the following system with forces f1 and f2 as the input. Put the answer in matrix format?



2 DOF system

5. An automobile wheel and tire are suspended by a steel rod 0.50 cm in diameter and 2 m long, as shown in the Fig. below. When the wheel is given an angular displacement and released, it makes 10 oscillations in 30.2 s. Determine the polar moment of inertia of the wheel and tire.



6. A body vibrating with viscous damping makes five complete oscillations per second, and in 50 cycles its amplitude diminishes to 10 percent. Determine the logarithmic decrement and the damping ratio. In what proportion will the period of vibration be decreased if damping is removed?