

**Electromechanics and Contromechanics**  
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**Knowledge Test - Questions**

- 1) Derive the governing equation of the circuit shown in Fig.1. and calculate its resonance frequency.

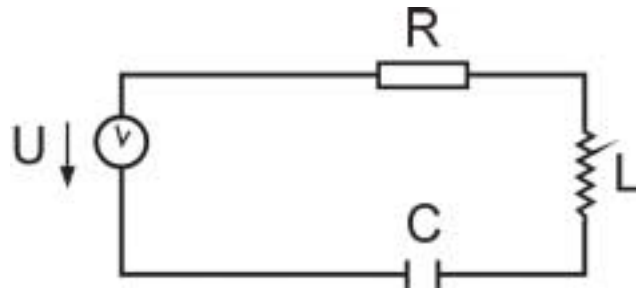


Fig.1: Simple Electric Circuit

- 2) For the mass-point shown in Fig. 2 a PD- controller is used to stabilize the zero position. Derive the closed loop transfer function.

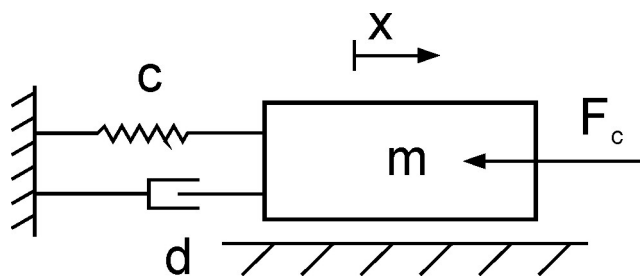


Fig.2: Stabilization with PD- Controller

- 3) Derive the equations of motion (plane x-y) of the rigid plate (mass M, dimension a, stiffness c) in elastic springs (Fig.3) with periodic force  $F(t) = F_0 \cdot \cos(\omega \cdot t)$ .

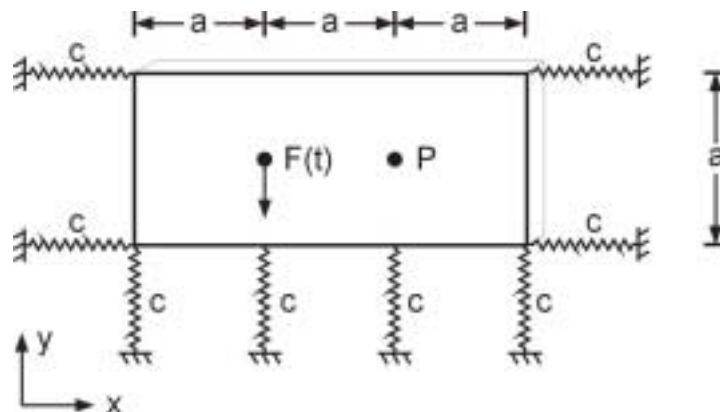


Fig.3: Rigid Body in elastic bedding

- 4) Calculate the natural frequencies and the natural modes of this system for small displacements.  
 5) Calculate the transmissibility of point P as a function of the frequency  $\omega$  of the exciting force  $F_0$ .