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## 1 Free Vibration of Single Degree-of-freedom Systems

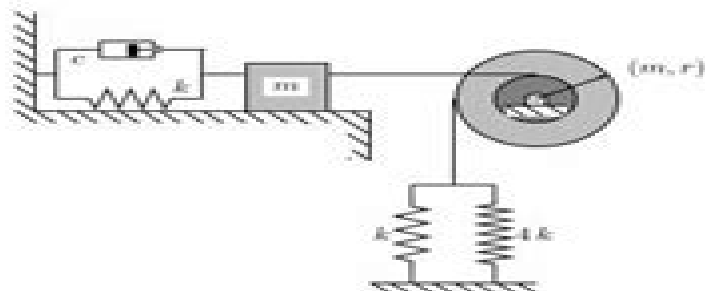
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### Problem 1:

In the figure, the disk and the block have mass  $m$  and the radius of the disk is  $r$ .

- Find the equations of motion for this system.
- What are the natural frequency and damping ratio of the system in terms of  $m$ ,  $c$ , and  $k$ ?
- If the block is displaced 18 cm to the right and released from rest find the resulting angular displacement of the disk with

$$m = 3 \text{ kg}, \quad r = 9 \text{ cm}, \\ k = 21 \text{ N/m}, \quad c = 63 \text{ N} \cdot \text{s/m},$$



# Mechanical Vibration Solved Manual

**M Woodhall**



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