

Reg. No. : .....

Name : .....

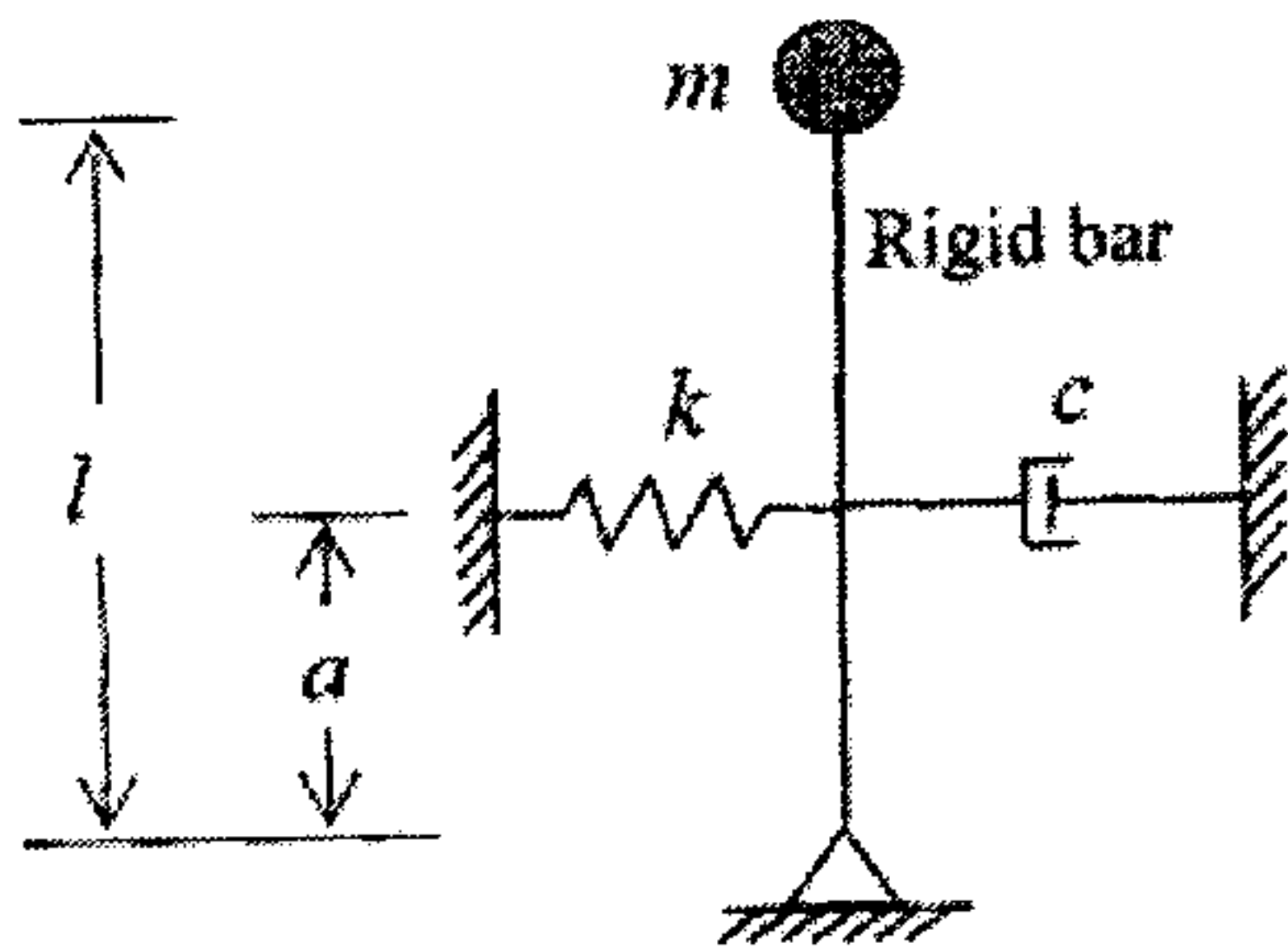
**First Semester M.Tech. Degree Examination, December 2016**  
**Branch – Civil Engg. (2008 Scheme)**  
**Stream – Structural Engineering**  
**CSC – 1001 : DYNAMICS OF STRUCTURES**

Time : 3 Hours

Max. Marks : 100

Answer **any five full** questions. **All** questions carry **equal** marks.

1. Set up the differential equation of motion for the inverted pendulum system shown in figure and find its natural frequency, assuming small oscillations. The bar has a mass of  $\mu$  per unit length.



2. Determine the response of a damped single degree of freedom system subjected to unit step input.
3. A three storied shear building frame has storey height 3 m each. The total weight on the top beam is 7500 kg and the other two beams carry 10000 kg each. The columns have a uniform flexural rigidity of  $2 \times 10^6 \text{ Nm}^2$ . Find the natural frequencies and mode shapes of the frame.
4. a) Explain the mode superposition method of analysis as applied to a lumped mass system.  
b) Explain the conditions for damping uncoupling.
5. a) Derive the differential equation governing the flexural vibration of beams.  
b) Obtain the expressions for natural frequencies and mode shapes of a uniform beam simply supported at ends.
6. Write short notes on
  - a) Critical damping
  - b) Vibration isolation
  - c) Lagrange's equation
  - d) Coordinate coupling.