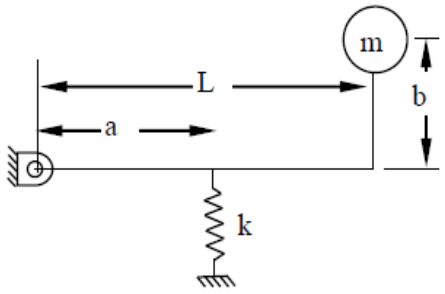
PRODUCTION ENGINEERING DEPARTMENT

ASSIGNMENT 2 MACHINE DYNAMICS MARKS 10

LAST DATE OF SUBMISSION 14/09/18

Vibration

- Discuss briefly with neat sketches the longitudinal, transverse and torsional vibrations. (May 2016)
- Explain the concept of over damping and under damping with the help of displacement-time diagrams for vibrating systems. (Dec 2015)
- Define the following terms: (i) Transmissibility (ii) Resonance (iii) Critical damping (iv) Whirling speed of shaft (Dec 2015)
- A body of mass 200 kg is resting on a spring-dashpot system. The stiffness of the spring is 18 kN/m and the damping co-efficient of the dashpot is 250 N/m/sec. If the body is subjected to a periodic disturbing force of 1500 N and of frequency equal to 0.75 times the undamped natural frequency, find (i) the amplitude of forced vibration, (ii) dynamic magnification factor, (iii) force transmitted to the support & (iv) transmissibility. (Dec 2015)
- Derive the equation of motion and hence find the natural frequency of vibration for the system shown in figure. Consider the beam to be massless and rigid. Assume a = 0.5 m; L = 1.2 m; b = 0.4 m; m = 5 kg and k = 1500 N/m.

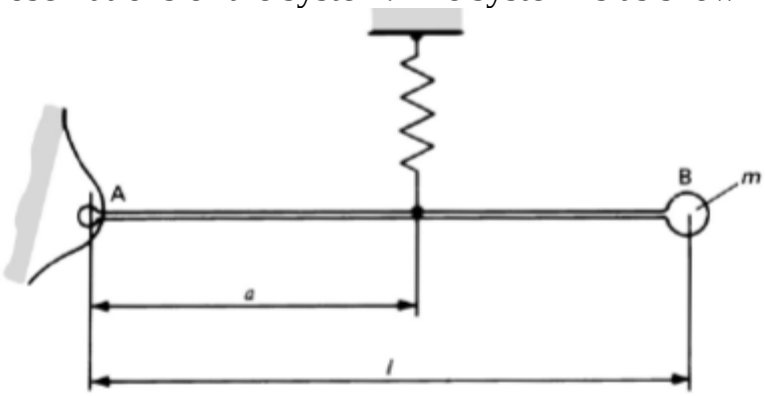


(Dec 2015)

- The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Determine: 1. Stiffness of the spring. 2. Damping factor, i.e. the ratio of the system damping to critical damping. (May 2016, May 2017)
- Explain the term ‘Logarithmic decrement’ as applied to damped vibrations. (May 2016)
- Explain the terms ‘under damping, critical damping’ and ‘over damping’ (May 2016)

- Derive the expression for natural frequency f_n by equilibrium method with all notations for free undamped longitudinal vibrations of a spring-mass-damper system. (Nov 2016)

- A vibrating system consists of a mass of 75 kg and a spring of stiffness 45 kN/m, and a damper. The damping provides only 25% of its critical value. Find: (i) Damping factor (ii) Critical damping coefficient (iii) Logarithmic decrement (iv) Ratio of two consecutive oscillations (v) Natural frequency of damped vibrations. (Nov 2016)
- Define in short the free vibrations, forced vibrations and damped vibrations. (Nov 2016)
- What are the basic elements of a vibratory system? What is the degree of freedom? (May 2017)
- What is the logarithmic decrement? Derive the relation for the same. (May 2017)
- A link AB in a mechanism is a rigid bar of uniform section 0.3 m long. It has a mass of 10 kg, and a concentrated mass of 7 kg is attached at B. The link is hinged at A and is supported in a horizontal position by a spring attached at the midpoint of the bar. The stiffness of the spring is 2 kN/m. Find the frequency of small free oscillations of the system. The system is as shown below.



(May 2017)

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