Roll No ....

MMMD/MMPD – 205

M.E./M.Tech. II Semester

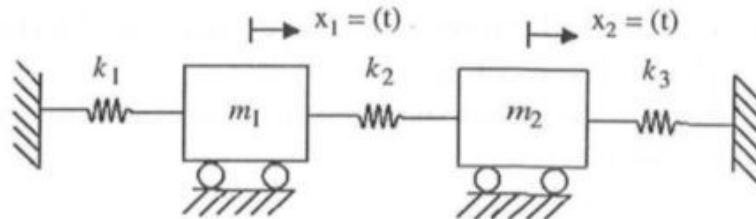Examination, December 2015

Vibration and Noise Control

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. Find the natural frequencies and mode shapes of the system shown in figure by matrix iteration method. Let $m_1 = m$, $m_2 = 2m$, $k_1 = k_2 = k$, $k_3 = 2k$.

2. a) Determine the normal functions in transverse vibration for a simply supported beam of length 1 and uniform cross section.

   b) Determine the normal functions for free longitudinal vibration of a bar of length L and uniform cross section. Both the ends of the bar are fixed.

3. Find an equation for the natural frequencies of a uniform rod in torsional oscillation for the system shown in figure :
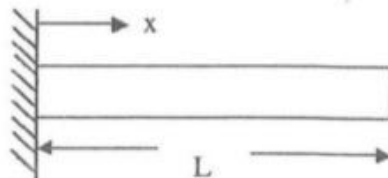
4. a) Explain the vibration absorbers and damped absorbers.

   b) A 200Kg turbine operates at speeds between 1000 and 2000rpm. The turbine has a rotating unbalance of 0.25 kg-m. What is the required stiffness of an undamped isolator such that the maximum force transmitted to the turbine's foundation is 1000N?

5. A non-linear spring for a single degree of freedom system is given by $K(x) = 10x + 2000x^3$

   C for viscous damping is 1.5kg/sec/cm. A harmonic force of 5 kg amplitude acts on the mass=1kg. Find the steady state response using the Direct Integration Method.

6. a) Explain the Duffing's equation and also write about the phase-plane technique.

   b) Explain the Time domain and Frequency domain analysis of signals.

7. a) Discuss the methods of measuring the Noise Level and briefly describe the methods of noise reduction.

   b) Explain the following terms with respect to noise :

      i) Decibel scale

      ii) Pressure and density level, Addition of levels.

8. Write short note on any four of the following:

   a) Perceived noisiness contours

   b) Jump phenomenon

   c) Octave band analysis of sound

   d) Perturbation method

   e) Holzer's method.

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