JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
MECHANICAL VIBRATIONS
(MACHINE DESIGN)

Time: 3hours   Max. Marks: 60

Answer any five questions
**All questions carry equal marks**
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1. A mass of 12 kg is suspended from one end of a helical spring and the other end is fixed. The stiffness of the spring is 10 kN/m. The damping coefficient is 60 Ns/m. If a periodic force of 200Sin60t N is applied at the mass in the vertical direction, find the amplitude of the forced vibrations and its value at resonant condition.

2. A vibratory system of natural frequency 8Hz starts its motion with initial displacement of one cm and a velocity of 56 mm/sec. Determine the amplitude, phase of displacement, velocity and acceleration.

3. A radio set of 20 kg mass must be isolated from a machine vibrating with amplitude of 0.05mm at 500 rpm. The set is mounted on four isolators, each having a spring scale of 36kN/m and damping factor of 400 N-s/m. Calculate the dynamic load on each isolator due to vibration, amplitude of vibration.

4. Discuss the techniques used for spectrum analysis to understand the behavior of a machine.

5. For the system shown in Figure 1, find out the natural frequencies of vibration and principal modes of vibration.

Fig.1
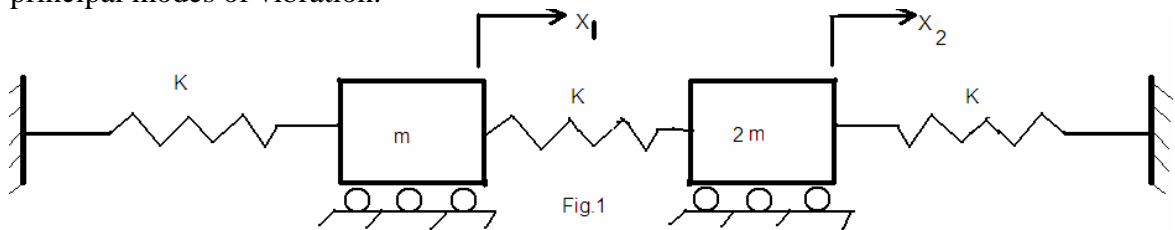
6. Calculate the stiffness matrix for the Figure 2.

Fig.2
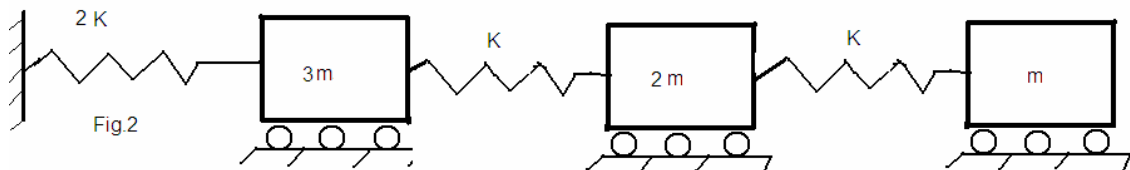
7. Find the natural frequency and mode shapes for the torsional system shown in Figure 3.

Fig.3
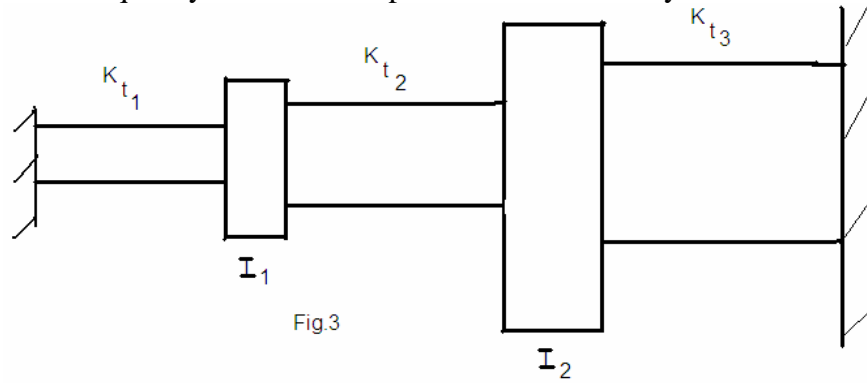
8. Write short notes on the following
   a) Vibration of String
   b) Modal Analysis
   c) Eigen values and Eigen vectors

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