Code No: OR420360 **OR**

IV B.Tech II Semester Supplementary Examinations, April/May 2005
MECHANICAL VIBRATIONS
(Mechanical Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

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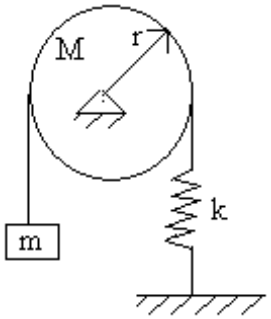
1. (a) Find the natural frequency for the following system.

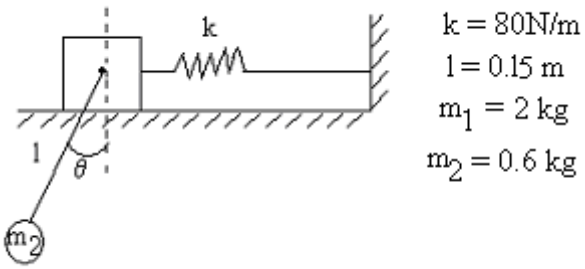


   (b) Derive the equation for the logarithmic decrement.

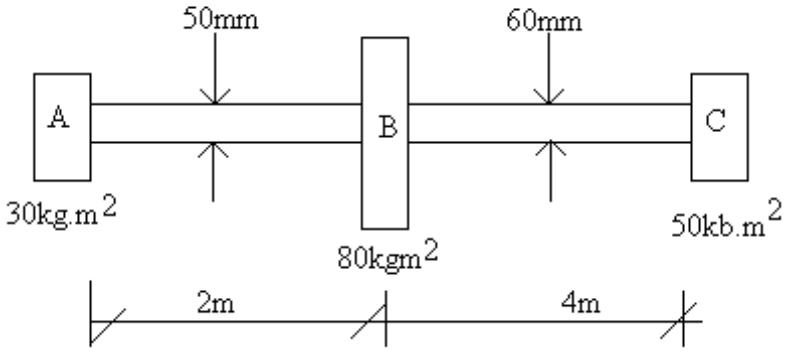
2. Derive the equation for motion for damped free vibration.

3. (a) Derive the equation for vibration transmissibility of a damped system.
   (b) A vibratory body of mars 200kg supported on a springs of total stiffness 1250kN/m has a rotating unbalance force of 550N at a speed of 5000 rpm. If the damping factor is 0.3, determine.
      i. The amplitude caused by the unbalance and its phase angle
      ii. The transmissibility
      iii. The actual force transmitted.

4. Determine the natural frequencies for the following vibration system.



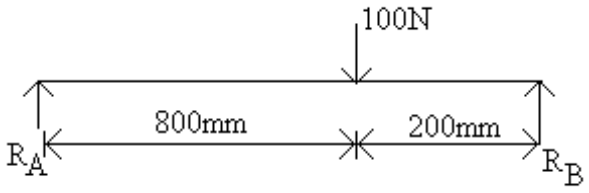
5. A torsinal system shown in figure. Find the frequencies of torsional vibrations and the positions of the nodes. Take G = 84 x 10^9 N/m^2.



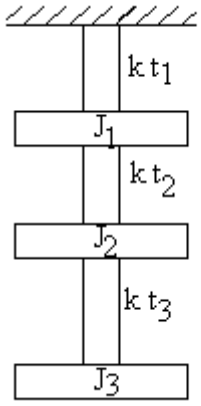
6. Find the lower natural frequency of vibration for the system shown in figure according to:

   (a) Dunker lay's method

   (b) Rayleigh's method Take E = 2 x 10^{11}N/m^2 dia of shaft = 50mm



7. Determine the natural frequency of the system shown in figure below using stadola method.



$k t_1 = k t_3 = 10x10^6$ kg - cm/rad.
$k t_2 = 20x10^6$ kg - cm/rad.
$J_1 = 10$ kg-cs - sec^2
$J_2 = 12$ kg-cs - sec^2
$J_3 = 15$kg-cs-sec^2

8. Explain the following:

   (a) Geared system

   (b) Vibration system

   (c) Degree of freedom system.

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