**Or**

8. Determine the natural frequencies for the system shown in **Fig-4**. Assume: $K_1 = 1000$ N/m, $K_2 = 500$ N/m, $m_1 = 50$ Kg and $m_2 = 10$ Kg.

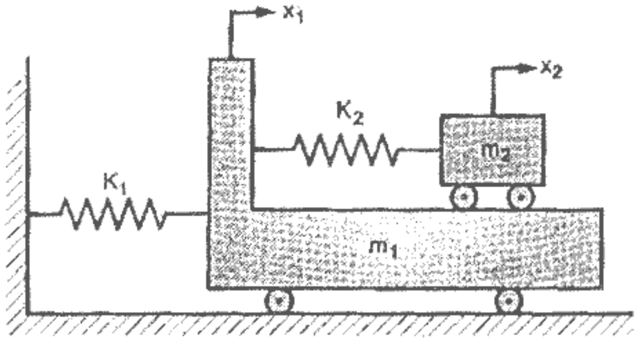


**Fig-4**

9. a) Explain in brief, following terms with respect to noise:
   i) Sound spectra
   ii) One octave band
   iii) One third octave band analysis

   b) Derive an equation for finding out sound intensity level at a distance *r* from the source of sound of known sound power level.

**Or**

10. a) Write a short note on " Noise due to constructior equipments and domestic appliances".

    b) Discuss various methods used in controlling industria noise.

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Total No. of Questions : 10]

Roll No ...............................

# AU/ME - 703

## B.E. VII Semester

Examination, December 2013

## Mechanical Vibration & Noise Engineering

*Time : Three Hours*

*Maximum Marks : 70*

*Note:* All questions are compulsory. Internal choice is given. Assume suitable data, if necessary.

1. a) Explain the phenomenon of beats. Also describe the lumped and distributed parameter systems.

   b) Assuming that the chord is in extensible and neglecting mass of pulley, determine the natural frequency of the system shown in **Fig-1.**

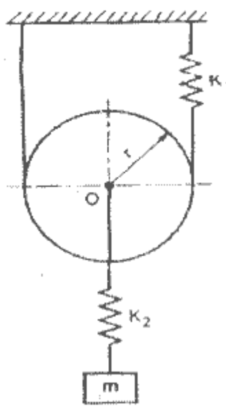


**Fig-1**

**Or**

2. a) Explain Rayleigh's method for determination of natural frequency of a vibratory system.



b) A V-tube manometer having liquid column of length $l$ has both ends open to atmosphere as shown in **Fig-2**. Find the natural frequency of oscillations of liquid column when tube is slightly displaced.



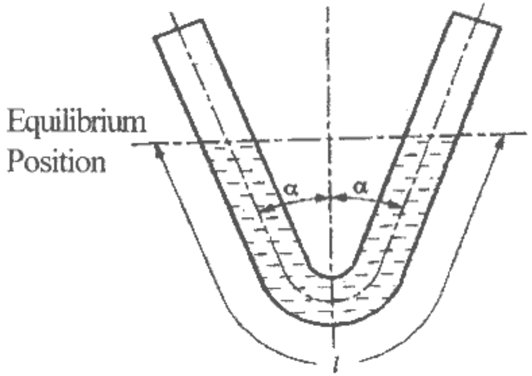


**Fig-2**

3. The mass of a spring mass dashpot system is given an initial velocity (from the equilibrium position) of C where is the under damped natural frequency of the system. Find the equation of motion for the cases when: i) = 1.5 ii) = 1.0 iii) = 0.30.

**Or**

4. a) Show that for viscous damping, loss factor is independent of the amplitude and proportional to frequency.

b) A mass of 1 Kg is suspended on a spring of 9800 N/m and has a dashpot having damping coefficient of 6 N-sec/m. Find the damped natural frequency. Also find the logarithmic decrement and amplitude after 4 cycles, if the initial displacement is 5mm.

5. a) A 500 Kg tumbler has an unbalance of 1.26 Kg, at 50 cm from its axis of rotation. For what stiffness of an elastic mounting of damping ratio 0.06, will the tumbler's steady state amplitude be less than 2 mm at all speeds between 200 and 600 rpm.







b) An aircraft radio weighing 118 kN is to be isolated from engine vibrations ranging in frequencies from 1600 cpm to 2200 cpm. What static deflection must the isolator have for 85% isolation?

**Or**

6. Define critical speed. The following data relate to a shaft held in long bearings:

Length of shaft = 1.2 m, Diameter of Shaft = 14 mm

Mass of rotor fitted over the mid span = 16 Kg

Eccentricity of centre of mass of rotor from the centre of rotor = 0.40 mm

Modulus of Elasticity = 200 GN/m$^2$

Permissible stress in shaft material = $70 \times 10^6$ N/m$^2$

Determine the critical speed of the shaft and the range over which it is unsafe to run the shaft. Assume the shaft to be mass less.

7. A schematic representation of an automobile is shown in **Fig-3.** If the automobile weighs 17.8 kN and has a radius of gyration about the centre of gravity of 1.37 m. Find the principle modes of vibration of the automobile. The combined front springs $k_1$ is 440 N/cm and combined rear springs $k_2$ is 475 N/cm.



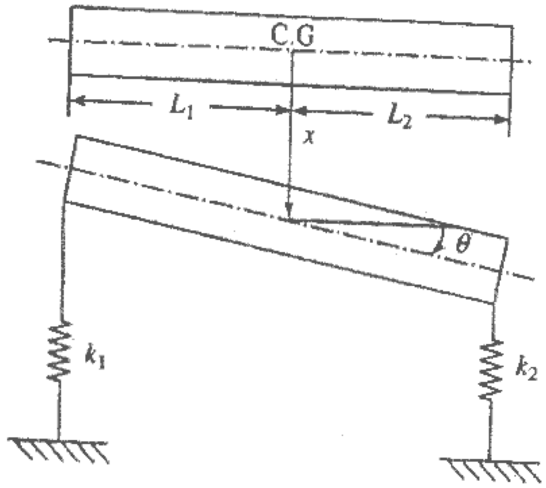




**Fig-3**