7. a) Derive an equation which gives the relation between sound intensity level and sound pressure level. Show that as the distance from a point source doubles, the sound intensity level decreases by 6 dB.

   b) Explain the working of Sound Level Meter and Sound Frequency Analyzer.

8. Explain in brief, following with respect to noise :

   i) Octava band analysis

   ii) Noise standards and limits

   iii) Noise control techniques

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Roll No .....

MMMD/MMPD-205

M.E./M.Tech., II Semester

Examination, June-2013

Vibration And Noise Control

Time : Three Hours

Maximum Marks : 70

Note: *Attempt any five questions.*
All questionss carry equal marks.
Assume buitable data, if necessary.

1. a) Define the flexibility and stiffness influence coefficients. What is the relation between them?

   b) Find the natural frequencies and mode shapes of the system shown in fig-1
   for $k_1 = k_2 = k_3 = k$ and $m_1 = m_2 = m_3 = m$.

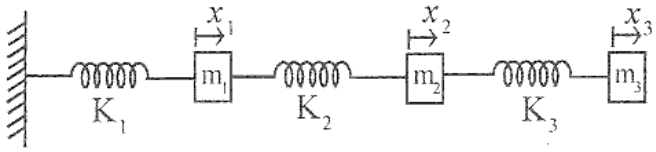

fig-1

2. Determine the influence coefficients of the spring mass system shown in fig-2 and hence find out the natural frequencies using the method of matrix itteration.

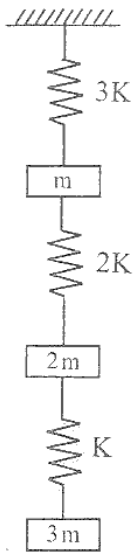

Fig -2

3. a) A uniform beam fixed at one end and simply supported at the other is having transverse vibrations. Derive the suitable expression for frequency.

   b) Determine the equation for the natural frequencies of a uniform rod in torsional oscillation with one end fixed and the other end free.

4. a) What is the purpose of Experimental Model Analysis? Describe the use of frequency response function in Model Analysis.

   b) Write a short note on "Condition Monitoring and diagnosis".

5. a) What is the difference vibration isolator and vibration absorber? Explain the principle of working of an un-damped dynamic vibration absorber.

   b) A heavy machine of mass m is mounted through a resilient system on a foundation. The resilient system comprises of a spring of stiffness k and a viscous damper with damping coefficient c, the machine produces an excitation force $F(t) = F_0 \sin wt$.

   Derive the formula for total force transmitted to the foundation and prove that the forcing frequency should be greater than $\sqrt{2}$ times the natural frequency of the system in order to achieve vibration isolation.

6. a) What is the source of nonlinearity in Duffing's equation? How is the frequency of the solution of Duffing's equation is affected by the nature of the spring?

   b) A single degree of freedom shown in Fig-3 is subjected to a force whose spectral density is a white noise $S_x(w) = S_0$. Find the following :

      i) Complex frequency response function of the system

      ii) Power spectral density of the response

      iii) Mean square value of the response

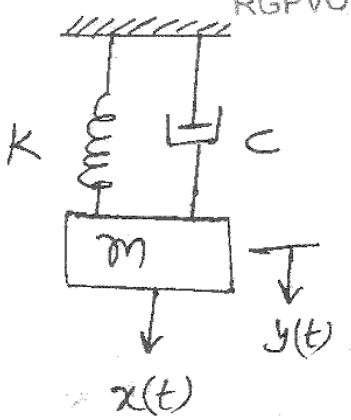

fig- 3