M.Tech. Mechanical Engineering Design CBCS Pattern Semester-I
MED13 - Mechanical Vibrations

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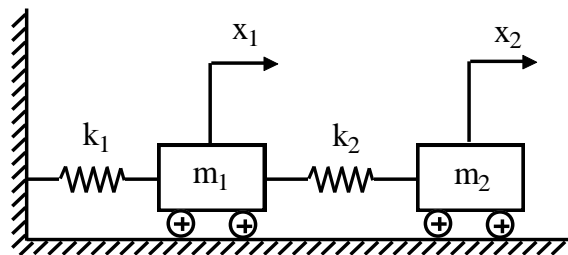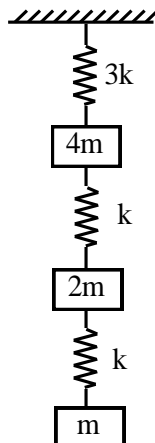
Notes : 1.   All questions carry equal marks.
         2.   Due credit will be given to neatness and adequate dimensions.
         3.   Assume suitable data wherever necessary.
         4.   Diagrams and Chemical equation should be given wherever necessary.
         5.   Illustrate your answers wherever necessary with the help of neat sketches.
         6.   Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing
              instruments, Thermodynamic tables for moist air, Psychrometric charts and
              Refrigeration charts is permitted. Non Programmable Electronic Calculator is
              allowed.
         7.   Answer **any five** questions.

1. a)   Explain terms related to vibration a. Force vibration b. Free or natural vibration.   **7**

        b)   Derive an expression for vibration response of a single degree of freedom system if the   **7**
             damping provided is over damped system.

2.   What do you mean by two degree of freedom system? Draw a two degree of freedom system   **14**
             and determine the two natural frequencies of that system.

3. a)   Find the natural frequencies and first two normal mode shapes of the system shown in Fig. **7**
             Assume k1=k2=k and m1=m2=m.

        b)   Derive an expression for vibration response of a single degree of freedom system if the   **7**
             damping provided is over damped system.

4.   Find out natural frequencies using matrix iteration method.   **14**

5.	a)	What are principles on which a Vibrometer and an accelerometer are based?	7
	b)	Write differential equations of motion in matrix form in terms of stiffness matrix.	7
6.	a)	Give two examples of non-linear vibration explain.	7
	b)	Explain in brief the continuous system of longitudinal vibration of Bars.	7
7.		A bar fixed at one end is pulled at the other end with a force P. The force is suddenly released, investigate the vibration of bar.	14
8.		Write short notes on following-	14

a) Frequency response plot   b) Analysis of vibration record

c) Modal Analysis   d) Vibration of strings

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