Roll No .....

MVSE - 201

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

Examination, July 2015

Structural Dynamics

Time : Three Hours ***Maximum Marks : 70***

Note : i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume suitable data wherever necessary.

1. a) Discuss critical damping.
   b) Model ϕ system shown in fig. 1 by a block attached to a single spring of an equivalent stiffness. Also determine the natural frequency of vibration.

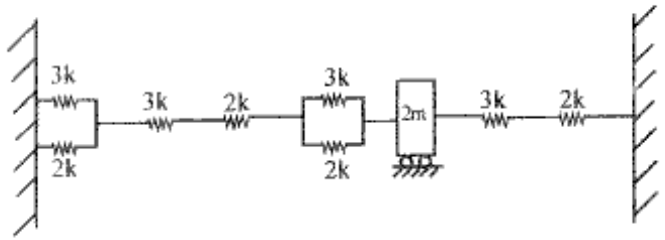

Fig. 1

2. Obtain a frequency equation for free vibration of slender beam fixed at one end and simply supported at the other.

3. Derive an expression for motion of a concentrated mass having free viscously damped vibration. Show that the decay in amplitude of vibration is exponential.

4. An undamped system is subjected to the rectangular pulse as shown in fig.2. Obtain expression for displacement response.

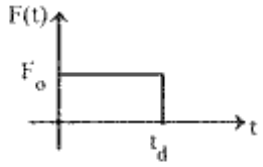

Fig.2

5. Explain :
   a) Central difference method and
   b) Newmark's method for numerical evaluation of dynamic response of single degree of freedom system.

6. A three story single bay structure is shown in fig.3. The masses lumped at storey levels. The spring constants are noted in the figure, obtain a characteristic equation. Whose roots will give natural frequencies of vibration.

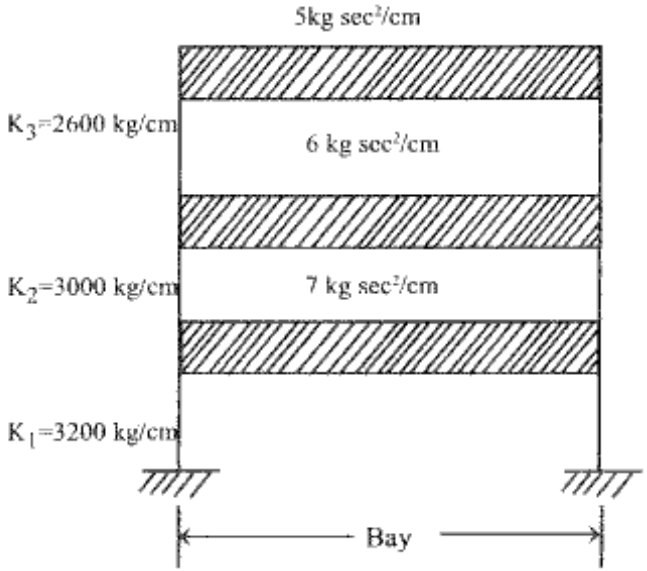

Fig. 3

7. A simple bent having a symmetrical distribution of mass has column of unequal sectional areas. The girder is depressed in such a way as to cause equal displacements of the top of columns. It is suddenly released at t=0. Determine the configuration of the possible free vibrations and the displacement at any time t. E = 2 ×10⁶kg/cm². The bent is shown in fig. 4.

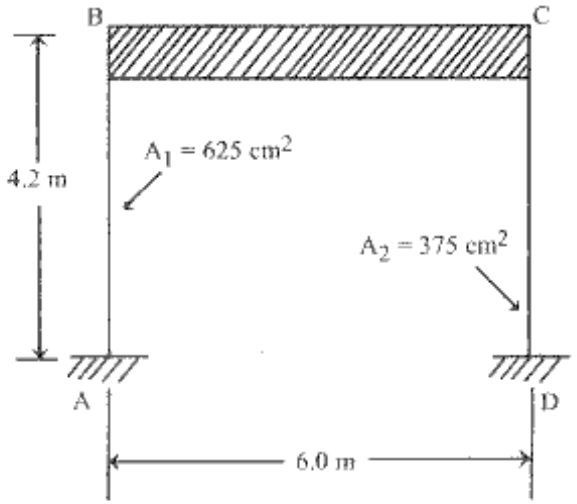

Fig.4

8. Explain Any two of the following :
   a) Steady state vibration
   b) Matrix formulation
   c) Approximate method of Rayleigh-Ritz

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