Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

ME/AU-7001 (CBGS)

B.E. VII Semester

Examination, November 2018

Choice Based Grading System (CBGS)

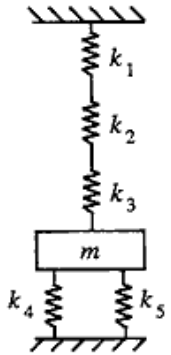
Mechanical Vibrations

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. For the system shown in figure below k_1 = 2000N/m, k_2 = 1500N/m, k_3 = 3000N/m and $k_4 = k_5$ = 500N/m. Find out m such that the system has a natural frequency of 10Hz.

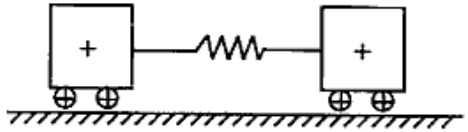


2. The mass of a spring-mass dashpot system is given an initial velocity (from the equilibrium position) of Aw_n where w_n is the undamped natural frequency of the system. Find the equation of motion for the system, for cases when
i) $\xi = 2.0$
ii) $\xi = 1.0$

3. Show that the maximum velocity of vibration of a mass of a spring-mass-dashpot system occures at $(w/w_n) = 1$ irrespective of the amount of damping.

4. Determine the critical speed of a 1000 kg automobile travelling on a concrete road with expansion joints spaced 12 metres apart, if the static deflection of the spring system is 50mm.

5. For the figure below two rail road cars of mass 10 tonnes each. They are coupled by spring of total stiffness 2.94×10^6N/m. How many natural frequencies does this system have? Find their values.



Figure

6. Deduce the equation of a whirling of light flexible shaft with an unbalanced disk at the centre of its length with a without damping.

7. a) Discuss Newton's law and use it to derive equation for multiple degree of freedom system.
b) Discuss free vibration and forced vibrations of undamped system.

8. Write short notes on followings:
a) Frequency response plots
b) Phase shift plots
c) Analysis of vibration records
d) Amplitude and frequency measurement of vibrating systems

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