D17002090

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 **M.TECH**

M.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017
MACHINE VIBRATION
Branch: MD, Subject Code:MMDPC1030
Time: 3 Hours
Max Marks : 70
The figures in the right hand margin indicate marks.

PART-A

(2X10=20 MARKS)

1. Answer the following questions .

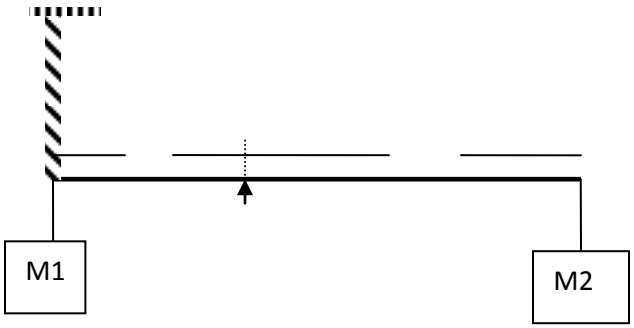
a. Define transmissibility.
b. Mention important types of free vibrations.
c. What is an accelerometer and what is its use?
d. What are three elementary part of a vibrating system?
e. How does a continuous system differ from a discrete system in the nature of its equation of motion?
f. Why is it important to find the natural frequency of a vibrating system?
g. What is Rayleigh's Principle?
h. What is the response for impulsive load or Shock loads?
i. What is mean by flexibility matrix?
j. Define degree of freedom of a vibrating system

PART-B

(5 X 10=50 MARKS)

Answer any five questions from the following.

2. a) How can we make a system to vibrate in one of its natural mode? **(2)**
b) Given that m1= 100kg, m2=200kg, stiffness constant k= 100kg/m determine the frequency and the equation of motion given at time 0 displacement =0 & Velocity =1m/sec. Assume that lever is weightless and LHS: RHS = 1:2. **(8)**



3. The maximum velocity attained by the mass of a simple harmonic oscillator is 0.10 m/s, and the period of oscillation is 2s. If the mass is released with an initial displacement of 20 mm, find
(a) the amplitude, the initial velocity **(5)**
(b) the maximum acceleration (d) the phase angle. **(5)**

4. A single rotor of mass 10 kg is mounted midway between bearings on steel shaft 25 mm in diameter and 400 mm between the bearings the system rotates at 3200 rpm. It is known that center of gravity of rotor is 0.02 mm from the geometric axis. Find

   a. The critical speed of the shaft and The amplitude of vibration. **(6)**
   b. The vibratory force transmitted to the bearings at this speed. **(4)**

   Neglect the weight of the shaft to be simply supported and the shaft is horizontally supported. Take E = 2.1 X 10^6 kg / cm^2 and density 8 gm /cm^3.

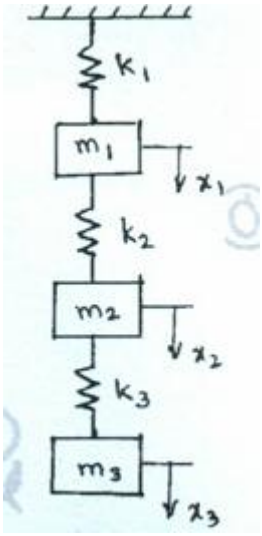
5. Define the terms damping coefficient, damping factor and logarithmic decrement?

   A vibrating system has the following constants : m = 17.5 kg, k=70 n/cm and c= 0.70 N/cm/s. Determine :

   (a) the damping factor, the natural frequency of damped oscillation. **(5)**
   (b) the logarithmic decrement, the ratio of many two consecutive amplitudes. **(5)**

6. a) What methods are available for solving the governing equations of a vibration problem? **(2)**
   b) Derive the Euler's equation of Transverse vibration of the beam. with fundamental Assumptions. **(8)**

7. a) Find the first natural frequency for the system shown in Fig. by matrix iteration method. **(5)**
   b) draw the mode shape for the system shown in Fig. by matrix iteration method. **(5)**
   Take k1= k2 = k3 = k and m1 = m2 = m3= m.



8 a) Derive natural frequency and the amplitude ration of forced vibration of undamped two degree of freedom system. **(5)**
   b) Determine the normal functions for free longitudinal vibration of a bar of length L and uniform cross-section. One end of the bar is fixed and the other free. **(5)**

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