

20/05/2019

Roll No.

Total Pages : 03

BT-6/M-19

36126

TRIBOLOGY AND MECHANICAL

VIBRATION

ME-304-N (Opt. II)

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

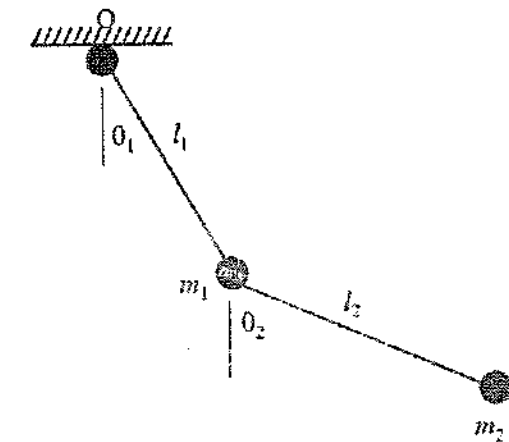
1. (a) Split the harmonic motion $x = 10\sin(\omega t + \pi/6)$ into two harmonic motions are having a phase angle of zero and the other of 45 deg.
(b) Derive an expression for the work done by Harmonic Force. 10
2. (a) Explain the critically damped and under damped system. 7
(b) Show that for viscous damping the loss factor is independent of the amplitude and proportional to the frequency. 8

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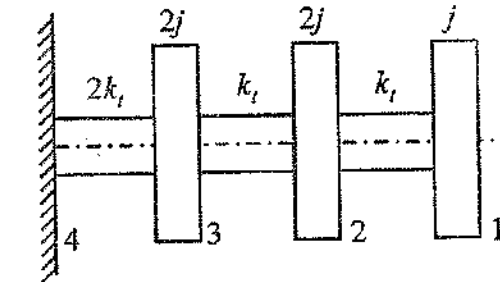
Unit II

3. A machine 100 kg. mass has a 20 kg. rotor with 0.5 mm eccentricity. The mounting springs have a stiffness $k = 85 \times 10^3$ N/m and damping factor = 0.02. The operating speed of machine is 600 rpm and the unit is constrained to move vertically determine :
- (a) The dynamic amplitude of machine
 - (b) The force transmitted to the supports. 15
4. (a) What is the difference between a vibration absorber and a vibration isolator ? 5
- (b) Determine the natural frequency of oscillation of the double pendulum as shown in fig. 1 where $m_1 = m_2 = 5$ kg; $l_1 = l_2 = 25$ cm. 10



Unit III

5. Using Holzer's method determine the natural frequencies of the system as shown in Fig. 2 : 15



6. Derive suitable expression for longitudinal vibrations for a rectangular uniform cross-section bar of length 1 fixed at one end and free at other end. 15

Unit IV

7. (a) Define the term "Tribology". What is its importance in industry ? 5
(b) Explain the friction and wear measurement techniques. 10
8. What are the different mechanism of adhesion ? Explain the asperity junction growth under frictional force. 15

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