Roll No. | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2011 Batch) (Sem.–7,8)
# MECHANICAL VIBRATIONS
Subject Code : BTME-803
Paper ID : [A3064]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   (a) Write the basic concepts of vibration.

   (b) State the important characteristics of beats.

   (c) Define critical damping and damping ratio.

   (d) What effect does a decrease in mass have on the frequency of a system?

   (e) Define two-degree of freedom system with neat sketch.

   (f) Write the importance of critical speed of shaft.

   (g) State the flexibility and stiffness influence coefficients.

   (h) What is Rayleigh's method, write its applications?

   (i) Define Periodic and Harmonic motion.

   (j) Write the parts of a vibrating system with neat sketch.

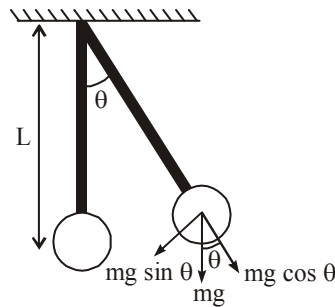## SECTION-B

2. Add two harmonic motions expressed by the following equations :

   $x_1 = 3 \sin (\omega t + 30°)$

   $x_2 = 2 \cos (\omega t - 15°)$

   and express the result in the form $x = A \sin (\omega t + \phi)$.

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3. A simple pendulum of length L, bob mass m, and rod mass M, is vibrating in the vertical plane. Calculate the frequency of free vibrations.


4. Draw a neat sketch of viscous damper & explain its working.

5. Prove that the logarithmic decrement is given by :

$$\delta = \frac{2\pi\xi}{\sqrt{1-\xi^2}}$$

6. Draw a neat sketch of centrifugal pendulum absorber and explain its working.

SECTION - C

7. Drive frequency equation for a beam with both ends free and having transverse vibrations.

8. Using matrix methods, determine the natural frequencies of the system shown below.
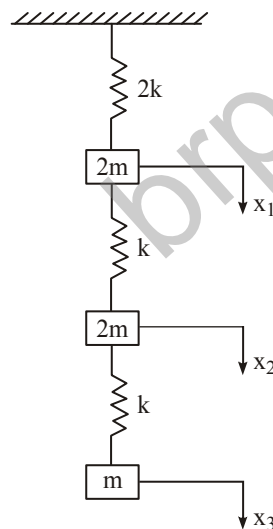
9. Write short notes on the following :

   (a) Accelerometer and Vibrometer

   (b) Vibration isolation

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