

Total No. of Questions : 09

Total No. of Pages : 02

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

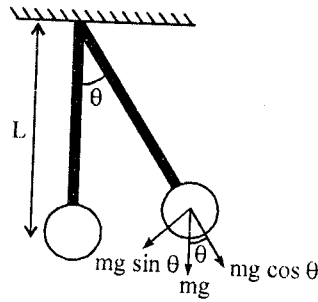
2. Add two harmonic motions expressed by the following equations :

$$x_1 = 3 \sin (\omega t + 30^\circ)$$

$$x_2 = 2 \cos (\omega t - 15^\circ)$$

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

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.



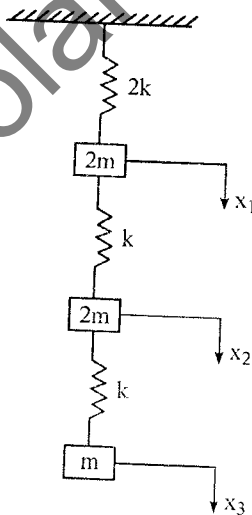
4. Draw a neat sketch of viscous damper & explain its working.
5. Prove that the logarithmic decrement is given by :

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

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