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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Automation & Robotics) (2012 & Onwards) (Sem.-7)

MECHANICAL VIBRATIONS

Subject Code : BTME-803

M.Code : 71808

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS 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 have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions

SECTION-A

1. Write briefly :

- a. Define the degree of freedom of a vibrating system.
- b. What are damped vibrations?
- c. Differentiate between linear and non linear vibrations.
- d. Define influence coefficient.
- e. What is the dynamic vibration absorber?
- f. Define viscous damping.
- g. What is basic assumption in deriving Dunkerlay's formula?
- h. What are common types of damping?
- i. What are the natural boundary conditions?
- j. Define spring stiffness and damping constant?

SECTION-B

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

$$x_1 = 4\cos(\omega t + 10^\circ)$$

$$x_2 = 6\sin(\omega t + 60^\circ)$$

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

3. Show that for finding the natural frequency of spring-mass system, the mass of the spring can be taken into account by adding one-third of its mass to the main mass.
4. Prove that the logarithmic decrement is given by :

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

5. A single degree of freedom viscous damping system makes five complete oscillations per second. Its amplitude diminishes to 15 percent in 60 cycles. Determine (a) the logarithmic decrement (b) damping ratio.
6. Draw a neat sketch of centrifugal pendulum absorber and explain its working.

SECTION-C

7. a. Write a short note on accelerometer.
- b. A vibrometer has a period of vibration of 2 seconds. It is attached to a machine with a vertical harmonic frequency of 1 Hz. If the vibrometer mass has an amplitude of 2.5 mm relative to the vibrometer frame, what is the amplitude of vibration of machine?
8. Define frequency equation for a beam with both ends free and having transverse vibrations.
9. Determine the value of influence coefficients for the system as shown in the Figure 1.

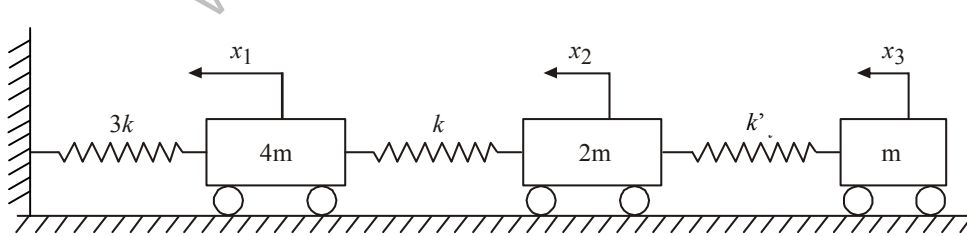


Fig.1

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.