Unit 7 - Week 6

Week 6 Assignment

The due date for submitting this assignment has passed. Due on 2018-03-21, 23:59 IST.
As per our records you have not submitted this assignment.

This assignment contains 10 questions. Each question has individual marks.

1) When a two-degree-of-freedom system is subjected to a harmonic force, the system vibrates at the *1 point*

- frequency of applied force
- smaller natural frequency
- larger natural frequency
- none

No, the answer is incorrect.
Score: 0

Accepted Answers:
frequency of applied force

2) Find the natural frequencies of the following system for $k_1 = k_2 = k_3 = k$, and $m_1 = m_2 = m$ *2 points*

- $\omega_1 = \sqrt{(k/m)}, \omega_2 = \sqrt{(3k/m)}$
- $\omega_1 = \sqrt{(2k/m)}, \omega_2 = \sqrt{(3k/m)}$
- $\omega_1 = \sqrt{(3k/m)}, \omega_2 = \sqrt{(2k/m)}$
- $\omega_1 = \sqrt{(3k/2m)}, \omega_2 = \sqrt{(2k/m)}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\omega_1 = \sqrt{(k/m)}, \omega_2 = \sqrt{(3k/m)}$

3) Using the figure of Q.02. Find the natural frequencies (rad/second) of the system shown in figure for $m_1 = 2$ kg, $m_2 = 5$ kg, $k_1 = k_2 = 3$ N/m, and $k_3 = 4$ N/m. *2 points*

- $\omega_1 = 0.2, \omega_2 = 3.854$
- $\omega_1 = 2.74, \omega_2 = 3.02$

Week 8

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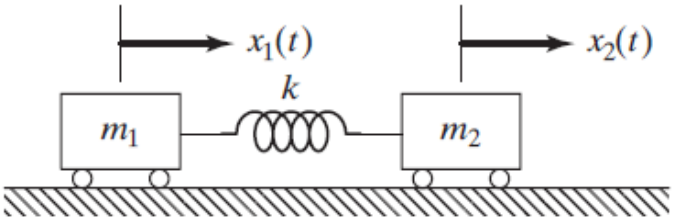
$\omega_1 = 0.979, \omega_2 = 1.854$

$\omega_1 = 4.23, \omega_2 = 9.27$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\omega_1 = 0.979, \omega_2 = 1.854$

4) Find the natural frequency of the system as shown in the figure below for m1 = 3 kg, m2 = 6 kg, and k = 250 N/m. ***3 poi***



$\omega_1 = 0, \quad \omega_2 = 11.18$

$\omega_1 = 0, \quad \omega_2 = 9.57$

$\omega_1 = 4, \quad \omega_2 = 12.52$

$\omega_1 = 0, \quad \omega_2 = 17.32$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\omega_1 = 0, \quad \omega_2 = 11.18$

5) Using the figure of Q.4. Find the mode shape of the system ***3 points***

$X_1 = \begin{bmatrix} 1 \\ 1.5 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.78 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 1.5 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.51 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 0.86 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.78 \end{bmatrix}$

$\begin{bmatrix} 1 \\ 1 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.87 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\begin{bmatrix} 1 \\ 1 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.87 \end{bmatrix}$

6) A machine tool, having a mass of 1000 kg and a mass moment of inertia of J_0 = 300 kg-m^2 is supported on elastic supports, as shown in Figure given below. If the stiffness of the support is given by 3000 N/mm and 2000 N/mm, and the supports are located at 0.5 m and 0.8 m, find the natural frequencies. ***3 points***

$\omega_1 = 110, \omega_2 = 40.18$

$\omega_1 = 50, \omega_2 = 39.57$

$\omega_1 = 70.57, \omega_2 = 82.373$

$\omega_1 = 0, \omega_2 = 85.32$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\omega_1 = 70.57, \omega_2 = 82.373$

7) Using Q.6, find the mode shapes of the machine tool. ***3 points***

$X_1 = \begin{bmatrix} 1 \\ 1.5 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.78 \end{bmatrix}$

$X_1 = \begin{bmatrix} 1 \\ -5.34 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ 0.056 \end{bmatrix}$

$X_1 = \begin{bmatrix} 1 \\ 0.86 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.75 \end{bmatrix}$

$X_1 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ -0.87 \end{bmatrix}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$X_1 = \begin{bmatrix} 1 \\ -5.34 \end{bmatrix}, X_2 = \begin{bmatrix} 1 \\ 0.056 \end{bmatrix}$

8) Figure shows a vibrating system having two degree of freedom. The ratio of amplitudes of the motion of m_1 *amd* m_2 for the two mode of the vibration. Given: $m_1 = 1.5\ kg$ *and* $m_2 = 0.8\ kg$ and $k_1 = k_2 = 40\ N/m$. ***3 points***

-0.765, 0.696
2.56, 0.456
6.450, 0.969
0.569, 4.547

No, the answer is incorrect.
Score: 0

Accepted Answers:
-0.765, 0.696

9) In the system shown in the figure, the mass m1 is excited by a harmonic force 40sin(4πt) N. Find the forced amplitude (in mm) of each mass for m_1= 15 kg, m_2= 10 kg, k_1= 6000 N/m, and k_2=1500 N/m. ***3 points***

X_1= 14.25, X_2= 56.4

- $X_1 = 1.49, \quad X_2 = 28.0$
- $X_1 = 9.773 \ , X_2 = 16.148$
- $X_1 = 12.148, \quad X_2 = 3.458$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$X_1 = 1.49, \quad X_2 = 28.0$

10) The mass and stiffness matrices and the mode shapes of a two-degree-of-freedom system are given by *0 points*

- 12, 2.4, 1.581
- 24, 5.4, 2.58
- 28, 6, 8.5
- 17, 7, 3.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
12, 2.4, 1.581

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