Week 8 Assignment

The due date for submitting this assignment has passed. **Due on 2018-04-04, 23:59 IST.**

As per our records you have not submitted this assignment.

This assignment contains 10 question. Each question has the individual mark.

1) The number of distinct natural frequencies for an \( n \)-degree-of-freedom system can be

- \( n^{-1} \)
- \( n^2 \)
- \( n^n \)
- \( n \)

**No, the answer is incorrect.**

**Score:** 0

**Accepted Answers:**

- \( n \)

2) The fundamental natural frequency of a system is

- the largest value
- the smallest value
- any value
- none

**No, the answer is incorrect.**

**Score:** 0

**Accepted Answers:**

- the smallest value

3) Derive the equation of motion of system shown in the figure below and select the corresponding stiffness matrix of system.

\[
\begin{bmatrix}
3K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 3K
\end{bmatrix}
\]

\[
\begin{bmatrix}
K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 3K
\end{bmatrix}
\]
27/07/2020  Introduction to Mechanical Vibration - Unit 9 - Week 8

3 points

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
\begin{bmatrix}
3K & -2K & -K \\
-2K & 3K & -K \\
-K & -K & 3K
\end{bmatrix}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
\begin{bmatrix}
3K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 3K
\end{bmatrix}
\]

4) Mass matrix corresponding to the figure below is

\[
\begin{bmatrix}
m & 0 & 0 \\
m & m & 0 \\
m & m & m
\end{bmatrix}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
\begin{bmatrix}
m & 0 & 0 \\
0 & m & 0 \\
0 & 0 & m
\end{bmatrix}
\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[
\begin{bmatrix}
m & m & m \\
m & m & m \\
m & m & m
\end{bmatrix}
\]

5) The stiffness matrix of the system shown in figure below is

\[
\begin{bmatrix}
3k & -2k & 0 \\
-2k & 3k & -k \\
0 & -k & 3k
\end{bmatrix}
\]
3 points

6) A vibrating system for which

\[
\begin{bmatrix}
1 & 0 & 0 \\
0 & 2 & 0 \\
0 & 0 & 1
\end{bmatrix}, \text{ and } \begin{bmatrix}
1 & -2 & 1 \\
-2 & 4 & -2 \\
1 & -2 & 1
\end{bmatrix}
\]

Determine the eigenvalues for the above system and choose the correct option from the following:

\[\lambda_1 = 0, \lambda_2 = 0, \lambda_3 = 4\]
\[\lambda_1 = 0, \lambda_2 = 2, \lambda_3 = 0\]
\[\lambda_1 = 0, \lambda_2 = 1, \lambda_3 = 4\]
\[\lambda_1 = 9, \lambda_2 = 0, \lambda_3 = 6\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[\lambda_1 = 0, \lambda_2 = 0, \lambda_3 = 4\]

7) A vibrating system for which

\[
\begin{bmatrix}
1 & 0 & 0 \\
0 & 2 & 0 \\
0 & 0 & 1
\end{bmatrix}, \text{ and } \begin{bmatrix}
1 & -2 & 1 \\
-2 & 4 & -2 \\
1 & -2 & 1
\end{bmatrix}
\]

Determine the natural frequencies for the above system and choose the correct option from the following:

\[\omega_1 = 0 \text{ rad/s}, \omega_2 = 3 \text{ rad/s}, \omega_3 = 2 \text{ rad/s}\]
\[\omega_1 = 0 \text{ rad/s}, \omega_2 = 1 \text{ rad/s}, \omega_3 = 2 \text{ rad/s}\]
\[\omega_1 = 0 \text{ rad/s}, \omega_2 = 0 \text{ rad/s}, \omega_3 = 2 \text{ rad/s}\]
\[\omega_1 = 2 \text{ rad/s}, \omega_2 = 0 \text{ rad/s}, \omega_3 = 2 \text{ rad/s}\]

No, the answer is incorrect.
Score: 0
Accepted Answers:
8) Derive the equation of motion of system shown in the figure below and calculate the stiffness matrix for the system shown in the figure.

\[
\begin{bmatrix}
2K & 2K & 0 \\
2K & 3K & -K \\
0 & -K & 4K
\end{bmatrix}
\]

\[
\begin{bmatrix}
3K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 4K
\end{bmatrix}
\]

\[
\begin{bmatrix}
3K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 3K
\end{bmatrix}
\]

No, the answer is incorrect.
Score: 0

Accepted Answers:
\[
\begin{bmatrix}
3K & -2K & 0 \\
-2K & 3K & -K \\
0 & -K & 4K
\end{bmatrix}
\]

9) Derive the equation of motion of system shown in the figure below and choose the stiffness matrix of the system.

\[
\begin{bmatrix}
K1 + K2 & -K2 & 0 \\
-K2 & K2 + K3 & -K4 \\
0 & -K4 & K3 + K4
\end{bmatrix}
\]

\[
\begin{bmatrix}
K1 + K2 & -K2 & 0 \\
-K2 & K2 + K3 & -K3 \\
0 & -K3 & K4
\end{bmatrix}
\]

\[
\begin{bmatrix}
K1 + K2 & -K2 & 0 \\
-K2 & K3 & -K3 \\
0 & -K3 & K4
\end{bmatrix}
\]

\[
\begin{bmatrix}
K1 + K2 & -K2 & 0 \\
-K2 & K2 + K3 & -K3 \\
0 & -K3 & K3 + K4
\end{bmatrix}
\]

No, the answer is incorrect.
Score: 0

Accepted Answers:
\[
\begin{bmatrix}
K1 + K2 & -K2 & 0 \\
-K2 & K2 + K3 & -K3 \\
0 & -K3 & K3 + K4
\end{bmatrix}
\]
10. Derive the equation of motion of the system shown in the figure below and choose the correct damping matrix of the system from the following options.

\[
\begin{bmatrix}
c & 0 & 0 \\
0 & 2c & -c \\
0 & -c & 3c \\
\end{bmatrix}
\]

No, the answer is incorrect.

Score: 0

Accepted Answers:

\[
\begin{bmatrix}
c & 0 & 0 \\
0 & c & -c \\
0 & -c & 3c \\
\end{bmatrix}
\]