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Courses » Introduction to Mechanical Vibration Announcements Course Ask a Question Progress



Unit 9 - Week 8

Course outline

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Lesson 1 - Undamped free vibration

Lesson 2 - Eigen values and eigen vectors

Lesson 3 - Flexibility influence coefficients

Lesson 4 - Stiffness influence coefficients

Lesson 5 - Static and dynamic coupling

Quiz : Week 8 Assignment

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Introduction to mechanical vibration : week 8th assignment

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 **1 point**

- 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 **1 point**

- 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 **3 points** the corresponding stiffness matrix of system.

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

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

solution is
available

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$$\begin{bmatrix} 3K & -2K & K \\ -2K & 3K & -K \\ K & -K & 3K \end{bmatrix}$$

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

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

$$\begin{bmatrix} m & 0 & 0 \\ m & m & 0 \\ m & m & m \end{bmatrix}$$

$$\begin{bmatrix} m & 0 & 0 \\ 0 & m & 0 \\ 0 & 0 & m \end{bmatrix}$$

$$\begin{bmatrix} m & m & m \\ m & m & m \\ m & m & m \end{bmatrix}$$

$$\begin{bmatrix} m & m & m \\ 0 & m & m \\ 0 & 0 & m \end{bmatrix}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} m & 0 & 0 \\ 0 & m & 0 \\ 0 & 0 & m \end{bmatrix}$$

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

2 poi



3 points

$$\begin{bmatrix} 3k & -2k & 0 \\ -2k & 3k & -k \\ 0 & -k & 3k \end{bmatrix}$$



$$\begin{bmatrix} k & -k & 0 \\ -k & 2k & -k \\ 0 & -k & k \end{bmatrix}$$

$$\begin{bmatrix} 3k & -2k & 0 \\ -2k & 3k & -k \\ 0 & -k & 3k \end{bmatrix}$$

$$\begin{bmatrix} 3k & -2k & 0 \\ -2k & 3k & -k \\ 0 & -2k & 3k \end{bmatrix}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} k & -k & 0 \\ -k & 2k & -k \\ 0 & -k & k \end{bmatrix}$$

6) A vibrating system for which

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

3 points

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

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

3 points

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:



$$\omega_1 = 0 \text{ rad/s}, \omega_2 = 0 \text{ rad/s}, \omega_3 = 2 \text{ rad/s}$$

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

0 points

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

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

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

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

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

3 points

$$\begin{bmatrix} K_1 + K_2 & -K_2 & 0 \\ -K_2 & K_2 + K_3 & -K_4 \\ 0 & -K_4 & K_3 + K_4 \end{bmatrix}$$

$$\begin{bmatrix} K_1 + K_2 & -K_2 & 0 \\ -K_2 & K_2 + K_3 & -K_3 \\ 0 & -K_3 & K_4 \end{bmatrix}$$

$$\begin{bmatrix} K_1 + K_2 & -K_2 & 0 \\ -K_2 & K_3 & -K_3 \\ 0 & -K_3 & K_3 + K_4 \end{bmatrix}$$

$$\begin{bmatrix} K_1 + K_2 & -K_2 & 0 \\ -K_2 & K_2 + K_3 & -K_3 \\ 0 & -K_3 & K_3 + K_4 \end{bmatrix}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} K_1 + K_2 & -K_2 & 0 \\ -K_2 & K_2 + K_3 & -K_3 \\ 0 & -K_3 & K_3 + K_4 \end{bmatrix}$$



10) Derive the equation of motion of system shown in the figure below and choose **3 points** correct damping matrix of the system from the following options.

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

$$\begin{bmatrix} c & 0 & 0 \\ 0 & c & -c \\ 0 & -c & 2c \end{bmatrix}$$

$$\begin{bmatrix} c & 0 & 0 \\ 0 & c & -c \\ 0 & -c & 3c \end{bmatrix}$$

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

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\begin{bmatrix} c & 0 & 0 \\ 0 & c & -c \\ 0 & -c & 3c \end{bmatrix}$$



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