

# Unit 5 - Week 3

<b>Course outline</b>
How to access the portal?
Week 0 Assignment 0
Week 1
Week 2
<b>Week 3</b>
● Lecture 11 : Impulse Load and Arbitrary Load
● Lecture 12 : Impulse Load and Arbitrary Load (Contd.)
● Lecture 13 : MDOF, 2-Dof System
● Lecture 14 : Normal Mode of Vib
● Lecture 15 : Natural Frequency and Mode Shapes
● Lecture Material
● Quiz : Assignment 3
○ Feedback for week 3
Week 4
Week 5
Week 6
Week 7
Week 8
<b>DOWNLOAD VIDEOS</b>
Solution
Live Session
Text Transcription

## Assignment 3

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

**Due on 2019-09-18, 23:59 IST.**

- The unit of impulse is
  - a. N-s
  - b. N/s
  - c.  $N\cdot s^2$
  - d.  $N/s^2$

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- The duration of impulse load is
  - a. Short
  - b. Large
  - c. Infinite
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- The expression of the impulse response of an under-damped SDOF system contains
  - a. Damping ratio
  - b.  $\omega_d$
  - c. Initial displacement
  - d. Initial velocity

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- The solution of impulse response is obtained by solving a free vibration problem with initial velocity as,
  - a.  $1/m$
  - b.  $1/m\omega_d$
  - c.  $m$
  - d.  $\omega_d$

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- An undamped SDOF system has a mass of 1kg and spring of stiffness 1N/m. A short duration load of magnitude 5N and a duration of 0.1s acts on the system. The load can be modeled as an impulse load. Find the amplitude of the response of the system
  - a. 0.5m
  - b. 5m
  - c. 0.25m
  - d. 2.5m

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- In case the system of Ques.5 has damping with a damping factor of 0.1. The maximum amplitude of the response will be
  - a. 0.4975m
  - b. 0.4767m
  - c. 0.5270m
  - d. 0.5025m

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: d.
- The response of a SDOF system under harmonic loading can be obtained using
  - a. Particular solution
  - b. Convolution integral
  - c. Duhamel integral
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- In convolution integral, an arbitrary load is considered as superposition of several
  - a. Harmonic load
  - b. Step load
  - c. Impulse load
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: c.
- A Duhamel's integral can be used when the initial conditions are
  - a. Zero displacement
  - b. Zero displacement and velocity
  - c. Zero velocity
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- A mode shape of 10-DOF system is a
  - a. Matrix
  - b. Column vector
  - c. Scalar
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- Which of the following can be true for a mass matrix
  - a. Diagonal
  - b. Symmetric
  - c. Positive definite
  - d. Positive semi-definite

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- Which of the following can be true for a stiffness matrix,
  - a. Diagonal
  - b. Symmetric
  - c. Positive definite
  - d. Positive semi-definite

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- Presence of a rigid body mode in a 2-DOF system is characterized by
  - a.  $\omega_1 = 0$
  - b.  $\omega_2 = 0$
  - c.  $\omega_1 = \omega_2$
  - d.  $\omega_1 = \omega_2 = 0$

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- Synchronous motion of an MDOF system occurs at
  - a. Rigid body mode
  - b. Normal mode
  - c. First normal mode
  - d. Zero initial conditions

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- An arbitrary vibration of an MDOF system is superposition of its
  - a. Initial conditions
  - b. Harmonic response
  - c. Normal modes
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: c.
- The size of modal matrix of a 10-DOF system is
  - a. 10X1
  - b. 1X10
  - c. 1X1
  - d. 10X10

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: d.
- A modal matrix is formed with the modes shapes as it's
  - a. Rows
  - b. Columns
  - c. Diagonal terms
  - d. None of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: b.
- The natural frequencies of a system with mass matrix  $\begin{bmatrix} m & 0 & 0 \\ 0 & m & 0 \\ 0 & 0 & m \end{bmatrix}$  and stiffness matrix  $\begin{bmatrix} k & -k & 0 \\ -k & 2k & -k \\ 0 & -k & k \end{bmatrix}$  are
  - a.  $0, \sqrt{\frac{k}{m}}, \sqrt{\frac{3k}{m}}$
  - b.  $0, \sqrt{\frac{2k}{m}}, \sqrt{\frac{3k}{m}}$
  - c.  $0, \sqrt{\frac{k}{m}}, \sqrt{\frac{6k}{m}}$
  - d.  $0, \sqrt{\frac{k}{m}}, \sqrt{\frac{k}{m}}$

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- One of the mode shapes of the above system is
  - a.  $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$
  - b.  $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$
  - c.  $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$
  - d.  $\begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: a.
- The stiffness matrix of an MDOF system is symmetric only for
  - a. Spring mass systems
  - b. System with no rotational DOF
  - c. System having lumped masses
  - d. All of the above

a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0  
Accepted Answers: d.