

## Unit 12 - Week 10

## Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Calculus of Variations: Functionals

Method of Lagrange Multipliers

Calculus of Variations: Condition for extremum

Calculus of Variations: Several variables

Quiz : Assignment 10

Week 10 Feedback Form : Introduction to Classical Mechanics

Week 11

Week 12

Live session

Video Download

## Assignment 10

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

**Due on 2020-11-25, 23:59 IST.**

1) Compute the principal moments of inertia for a homogenous thin rod of length  $l$  of mass  $M$ . Neglect the thickness of the rod. Select the correct answer. **3 points**

$$I_3 = 0, I_1 = I_2 = \frac{1}{3} Ml^2$$

$$I_3 = 0, I_1 = I_2 = \frac{1}{4} Ml^2$$

$$I_3 = 0, I_1 = I_2 = \frac{1}{8} Ml^2$$

$$I_3 = 0, I_1 = I_2 = \frac{1}{12} Ml^2$$

No, the answer is incorrect.  
Score: 0

Accepted Answers:

$$I_3 = 0, I_1 = I_2 = \frac{1}{12} Ml^2$$

2) Compute the principal moments of inertia for a homogenous sphere of radius  $R$  of mass  $M$ . Select the correct answer. **3 points**

$$I_1 = I_2 = I_3 = \frac{2}{5} MR^2$$

$$I_1 = I_2 = I_3 = \frac{3}{5} MR^2$$

$$I_1 = I_2 = I_3 = \frac{4}{5} MR^2$$

$$I_1 = I_2 = I_3 = \frac{1}{3} MR^2$$

No, the answer is incorrect.  
Score: 0

Accepted Answers:

$$I_1 = I_2 = I_3 = \frac{2}{5} MR^2$$

3) Compute the principal moments of inertia for a homogenous circular cylinder of radius  $R$  and height  $h$  and has mass  $M$ . Take  $x_3$  along the axis of the cylinder. Select the correct answer. **4 points**

$$I_1 = I_2 = \frac{1}{4} M(R^2 + h^2), I_3 = \frac{1}{2} MR^2$$

$$I_1 = I_2 = \frac{1}{4} M(R^2 + h^2/3), I_3 = \frac{1}{2} MR^2$$

$$I_1 = I_2 = \frac{1}{4} M(R^2 + h^2), I_3 = MR^2$$

$$I_1 = I_2 = \frac{1}{4} M(2R^2 + h^2), I_3 = \frac{1}{2} MR^2$$

No, the answer is incorrect.  
Score: 0

Accepted Answers:

$$I_1 = I_2 = \frac{1}{4} M(R^2 + h^2/3), I_3 = \frac{1}{2} MR^2$$