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NPTEL

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Courses » Compliant Mechanisms : Principles and Design

Announcements Course Ask a Question Progress

Unit 14 - Week 12: Six case-studies of compliant mechanisms



Course outline

How to access the home page?

Assignment 0

Week 1: Overview of compliant mechanisms; mobility analysis.

Week 2: Modeling of flexures and finite element analysis

Week 3: Large-displacement analysis of a cantilever beam and pseudo rigid-body modeling

Week 4: Analysis and synthesis using pseudo rigid-body models

Week 5: Structural optimization approach to "design for deflection" of compliant mechanisms

Week 6: Designing compliant mechanisms using continuum topology optimization;

Assignment Week 12

The due date for submitting this assignment has passed. **Due on 2018-04-18, 23:59 IST.** As per our records you have not submitted this assignment.

1) Assertion: Mechanical amplification is preferred over electronic amplification in enhancing the **1 point** resolution of a micromachined capacitive accelerometer.

Reasoning: Noise in the mechanical element is lower than that in the electronic circuit.

- Assertion is correct but not the reasoning.
- Assertion is incorrect but the reasoning is correct.
- Assertion and reasoning are both correct.
- Neither the assertion nor the reasoning is correct.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Assertion and reasoning are both correct.

2) Assertion: Output displacement in MicroN force sensor is measured using image processing. **1 point**

Reasoning: Vision-based sensing techniques are free of noise.

- Assertion is correct but not the reasoning.
- Assertion is incorrect but the reasoning is correct.
- Assertion and reasoning are both correct.
- Neither the assertion nor the reasoning is correct.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Assertion is correct but not the reasoning.

3) How many parts does the compliant circumferentially actuated radial pipe-gripping device?

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 0.95, 1.05

4) Assertion: Multiscale compliant mechanisms are used for cell-manipulation. **1 point**

Reasoning: Order of stiffness of a single biological cell ranges from 1 mN/m to 1 N/m.

- Assertion is correct but not the reasoning.

1 point

1 point

distributed compliance

Week 7: Spring-lever (SL) and spring-mass-lever (SML) models for compliant mechanisms, and selection maps

Week 8: Non-dimensional analysis of compliant mechanisms and kinetoelastic maps

Week 9: Instant centre and building-block methods for designing compliant mechanisms

Week 10: Bistable compliant mechanisms and static balancing of compliant mechanisms

Week 11: Compliant mechanisms and microsystems; materials and prototyping of compliant mechanisms

Week 12: Six case-studies of compliant mechanisms

- Lec 67: Micromachined accelerometers with Displacement-amplifying Compliant Mechanisms (DaCMs)
- Lec 68: Miniature compliant mechanisms as cell-manipulation tools
- Lec 69: Micro-newton force sensor
- Lec 70: Compliant

- Assertion is incorrect but the reasoning is correct.
- Assertion and reasoning are both correct.
- Neither the assertion nor the reasoning is correct.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Assertion and reasoning are both correct.

5) What is the role of static balancing in the compliant easy-chair for the elderly?

1 point

- To balance the chair preventing it from toppling.
- To make the system bistable.
- To compensate for the weight of the person.
- None of the above.

No, the answer is incorrect.

Score: 0

Accepted Answers:

To compensate for the weight of the person.

6) A bimodal bistable structure has ...

1 point

- two stable states.
- two stable states that can be traversed between in two different ways.
- two normal modes of vibration.
- two stable states with two normal modes of vibration.

No, the answer is incorrect.

Score: 0

Accepted Answers:

two stable states that can be traversed between in two different ways.

7) Kinetoelastostatic maps are used in the design of ...

1 point

- MicroN force sensor
- Compliant easy chair
- Compliant cell gripper
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

8) The stiffness of a micromechanical grasping mechanism should preferably be the stiffness of the biological cell it grasps.

1 point

- of the same order of
- less than the
- two orders greater than the
- three orders greater than the

No, the answer is incorrect.

Score: 0

Accepted Answers:

of the same order of

9) Sensitivity of a capacitive accelerometer can be increased by ...

1 point

- increasing mass.
- decreasing stiffness.
- decreasing sense-gap.
- All of the above

tissue cutting mechanism

- Lec 71: A compliant pipe-crawling robots
- Lec 72: A compliant easy-chair for the elderly
- Quiz : Assignment Week 12
- Solutions

MATLAB Online Access

MATLAB: Introduction to MATLAB

MATLAB: Vector and Matrix Operations

MATLAB: Advanced Topics

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

10) Modification to Abdolvand et al.'s accelerometer using a DaCM improved its resonance frequency by ... **1 point**

- 4%
- 14%
- 24%
- 34%

No, the answer is incorrect.

Score: 0

Accepted Answers:

34%



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