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reviewer2@nptel.iitm.ac.in ▼

Courses » **Compliant Mechanisms : Principles and Design**

Announcements **Course** Ask a Question Progress

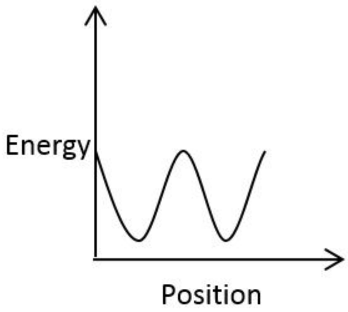
Unit 12 - Week 10: Bistable compliant mechanisms and static balancing of compliant mechanisms

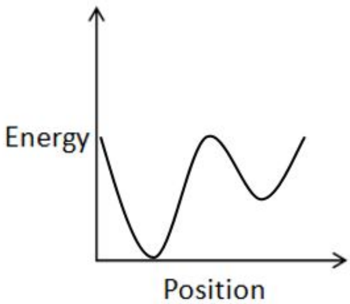
Course outline

Assignment Week 10

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.

1) Which of the following represents the strain energy curve of a bistable element? *1 point*





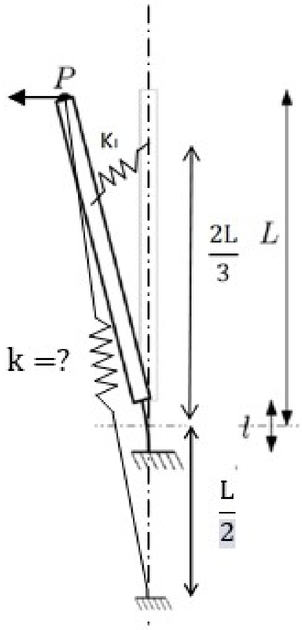
Both of the above

Neither of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both of the above

2) Consider a flexure-based lever attached to a zero-free length spring of stiffness k_1 as shown in the figure. What is the stiffness K of the balancing spring at the given instant? *1 point*



- $3(\frac{EI}{lL^2} + \frac{4}{9}k_l)$
- $2(\frac{EI}{lL^2} + \frac{4}{9}k_l)$
- $(\frac{EI}{3lL^2} + \frac{4}{27}k_l)$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
$2(\frac{EI}{lL^2} + \frac{4}{9}k_l)$

3) A symmetric shape of bistable arch cannot be obtained by linear combination of *1 point*

- First and third buckling mode shapes
- Second and fourth buckling mode shapes
- Both of the above
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Second and fourth buckling mode shapes

4) Assertion: The Critical point method used to find the force-displacement characteristics of bistable element gives approximate results. *1 point*

Reasoning: The critical point uses only two points namely switching force point and switch-back point to predict the entire Force-displacement curve.

- The statements in the assertion and reasoning are both correct and the reasoning is correct for the assertion.
- The statements in the assertion and reasoning are both correct but the reasoning is not correct for the assertion.
- The assertion is correct but not the reasoning.
- The statements in assertion and reasoning are both incorrect.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The assertion is correct but not the reasoning.

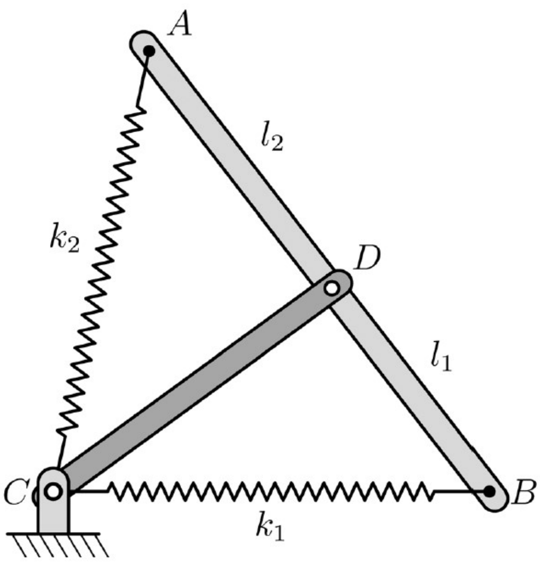
5) Mark the following statement as A if true and B if false. ***1 point***
It is impossible to statically balance a mechanism without auxiliary bodies.

- A
- B

No, the answer is incorrect.
Score: 0

Accepted Answers:
B

6) Consider the statically balanced linkage shown in the figure ***1 point***



The condition for perfect static balancing of the given linkage is…

- $k_1 l_2 = k_2 l_1$
- $k_1 l_1 = k_2 l_2$
- $k_1 = k_2 (l_1 + l_1)$
- $k_1 = k_2 (l_1 - l_2)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$k_1 l_1 = k_2 l_2$

7) In question 6, will the linkage be in equilibrium if the pivot at C is detached from the fixed frame? ***1 point***

- No
- Yes
- May be
- Insufficient information to conclude

No, the answer is incorrect.
Score: 0

Accepted Answers:

Yes

8) In question 6, is there a restriction on the length of CD for perfect static balance of the linkage? ***1 point***

- It cannot be larger than DA and DB.
- It cannot be smaller than DA and DB.
- It depends on DA, DB, and the two spring constants.
- There is no restriction.

No, the answer is incorrect.
Score: 0

Accepted Answers:
There is no restriction.

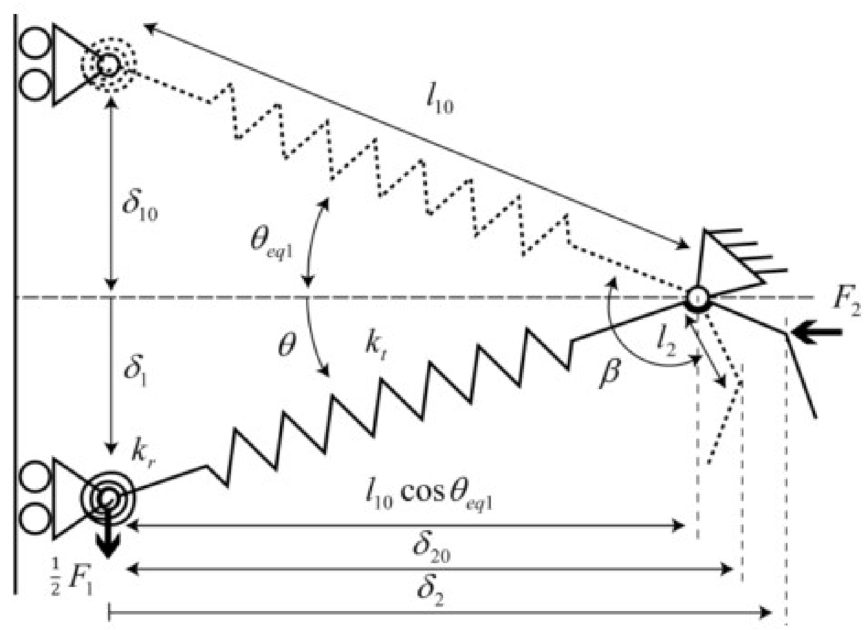
9) Assertion: Perfect static balancing of a compliant mechanism can be achieved over its complete range of motion with a linear balancing spring. ***1 point***
Reasoning: A compliant mechanism can be modelled as a linear translational spring over its complete range of motion.

- The statements in the assertion and reasoning are both correct and the reasoning is correct for the assertion.
- The statements in the assertion and reasoning are both correct but the reasoning is not correct for the assertion.
- The assertion is correct but not the reasoning.
- The statements in assertion and reasoning are both incorrect.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The statements in assertion and reasoning are both incorrect.

10) Consider the kinetoelastic model of a bistable element shown in the figure. ***1 point***



If stiffness of torsional spring is zero, what is the value of θ?

- $\frac{l_{10}\cos\theta_{eq1} - l_{10}}{l_{10}}$
- θ_{eq1}
- $\pi\theta_{eq1}$
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
θ_{eq1}

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