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NPTEL

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

Announcements **Course** Ask a Question Progress

Unit 7 - Week 5: Structural optimization approach to "design for deflection" of compliant mechanisms

Course outline

Assignment Week 5

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

Due on 2018-02-28, 23:59 IST.

1) A typical structural optimization problem consists of: ***1 point***

- an objective function.
- resource constraints.
- hierarchy in optimization.
- A and B

No, the answer is incorrect.
Score: 0

Accepted Answers:
A and B

2) Mutual strain energy is numerically equal to… ***1 point***

- the deflection at the point of application of applied load
- the displacement at the point of application of the unit dummy load in the direction of the dummy load
- the applied load
- the deflection at the point of application times the applied load.

No, the answer is incorrect.
Score: 0

Accepted Answers:
the displacement at the point of application of the unit dummy load in the direction of the dummy load

3) In design of a truss for desired deflection, the quantity $P_i p_i$ is always … ***1 point***

- negative.
- positive.
- zero.
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
None of the above

4) *Assertion:* Mutual strain energy cannot be computed for statically indeterminate trusses. ***1 point***
Reasoning: In statically indeterminate trusses, internal forces can be computed without knowing the areas of cross-sections.

- Assertion and reasoning are both correct statements, but the assertion does not follow from the reasoning.
- Assertion is incorrect but not the reasoning.
- Assertion and reasoning are both incorrect.
- Assertion and reasoning are correct statement and the assertion follows from the reasoning.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Assertion and reasoning are both incorrect.

5) *Assertion 1:* Ralph L. Barnett observed that for certain values of deflection, $P_i p_i$ becomes negative causing difficulty in obtaining a solution. ***1 point***

Assertion 2: This issue can be resolved by replacing $P_i p_i$ by $\left(P_i p_i\right)^2$ in the optimal area expression.

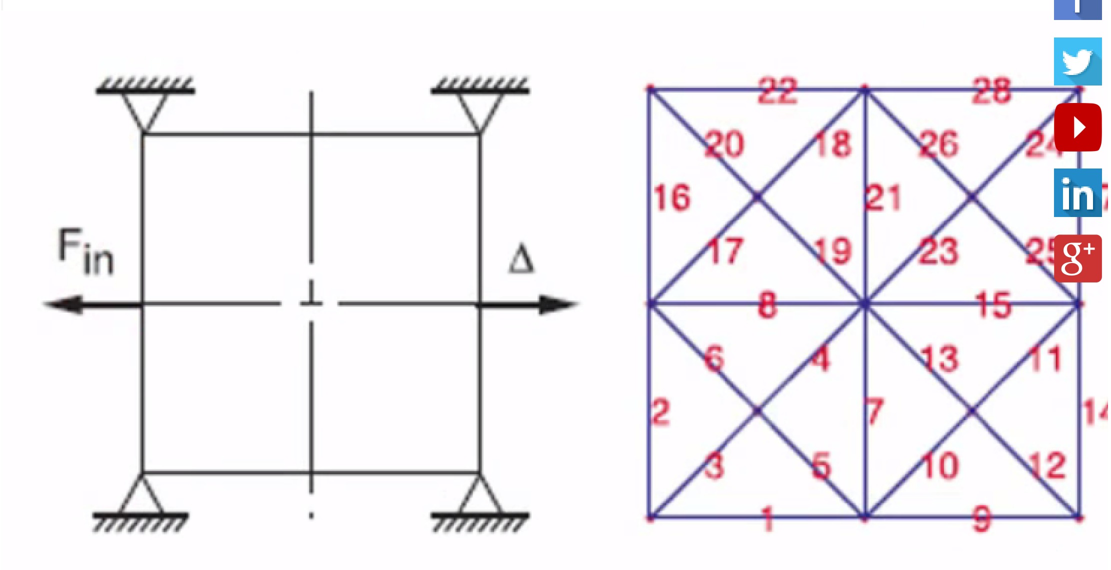
- Both assertions are correct.
- Assertion 1 is incorrect but not Assertion 2.
- Assertion 1 is correct but not Assertion 2.

Both assertions are incorrect.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Assertion 1 is correct but not Assertion 2.

6) Recall the optimal frame obtained topology obtained for the example case given below and select the frame number that is retained. ***1 point***



16
27
2
22

No, the answer is incorrect.
Score: 0

Accepted Answers:
22

7) The optimal area profile of a beam with desired deflection is ***1 point***

$A = \sqrt{\frac{Mm}{E}}$

$A = \sqrt{\frac{Mm}{E\alpha}}$

$A = \sqrt{\Lambda \frac{(Mm)^2}{E\alpha}}$

$A = \sqrt{\Lambda \frac{Mm}{E\alpha}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$A = \sqrt{\Lambda \frac{Mm}{E\alpha}}$

8) Design for deflection using mutual strain energy is …. ***1 point***

limited to trusses.
limited to trusses and frames.
limited by static determinacy.
applicable to all elastic bodies.

No, the answer is incorrect.
Score: 0

Accepted Answers:
applicable to all elastic bodies.

9) *Assertion 1:* Density of the discretized elements are updated in the inner loop of topology optimization code in the optimality criteria method. ***1 point***
Assertion 2: The outer loop of the code computes the Lagrange multipliers using the equality constraints.

Assertion 1 is correct but not Assertion 2.

- Assertion 2 is correct but not Assertion 1.
- Both the assertions are correct.
- Both the assertions are incorrect.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Both the assertions are incorrect.

10)According to the Optimality property 1 concerning the flexibility-stiffness formulation, the ratio of … is uniform throughout the continuum. *1 p*

- Strain energy to mutual strain energy
- Strain energy density to mutual strain energy
- Strain energy to mutual strain energy density
- Strain energy density to mutual strain energy density

No, the answer is incorrect.
Score: 0

Accepted Answers:
Strain energy density to mutual strain energy density

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