Assignment 11

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-10-17, 23:59 IST.

1) Select the correct option from A, B, C, and D.

Statement 1: The presence of bending-extension coupling in a laminated plate leads to an increase in out-of-plane deflection due to the presence of out-of-plane loads. Hence, such a coupling leads to a decrease in the effective bending stiffness of a laminate.

Statement 2: The presence of bending-extension coupling decreases buckling load as well as vibration frequencies.

- Both the statements are correct.
- Both the statements are incorrect.
- Statement 1 is correct but Statement 2 is incorrect.
- Statement 1 is incorrect but Statement 2 is correct.

No, the answer is incorrect.
Score: 0
Accepted Answers: Both the statements are correct.

2) Elements D16 and D26 of bending stiffness matrix [D] are called__________.

- Shear-extension coupling stiffnesses
- Bend-shear coupling stiffnesses
- Bend-twist coupling stiffnesses
- None of these

No, the answer is incorrect.
Score: 0
Accepted Answers: Bend-twist coupling stiffnesses
Consider a square, symmetric and specially orthotropic plate which is simply supported on all of its edges and is loaded in the x-direction as shown below in the figure. Assume that length of the side of the plate is $a$, and $D_{11}=D_{22}=D_{12}+2D_{66}=D$. Then such a plate will just start to buckle if the compressive force resultant $N= \frac{4\pi D}{a^2}$.
5) Consider a perfectly flat plate with symmetric laminate; which is loaded compressively on its mid-plane. The loads are in-plane. In such a plate, which of the following factors may trigger buckling?

- Out-of-plane imperfections in plate’s flatness
- Out-of-plane small disturbances.
- Very slight asymmetry in lamination sequence
- All of the above.

No, the answer is incorrect.
Score: 0
Accepted Answers:
All of the above.

6) An infinitely-long, symmetric, and specially orthotropic composite plate with simply supported edges is shown in the figure below. The composite plate will buckle if the applied force \( N \) exceeds ________. Assume that width of the plate \( (b) \) is 1m.

\[ 2D_{22} \pi^2 \]
\[ 2\pi^2 \left[ (D_{12} + 2D_{66}) + \sqrt{D_{11}D_{22}} \right] \]
\[ \pi^2 \left[ D_{22} + \sqrt{(D_{12} + 2D_{66})^2} \right] \]
\[ \pi^2 \left[ D_{11} + \sqrt{(D_{12} + 2D_{66})^2} \right] \]

No, the answer is incorrect.
Score: 0
Accepted Answers:
\[ 2\pi^2 \left[ (D_{12} + 2D_{66}) + \sqrt{D_{11}D_{22}} \right] \]

7) A force ‘\( N \)’ is applied to an infinitely long isotropic plate with simply supported edges as shown in the following figure. At a certain value of \( N \), the plate will start buckling. The wave-length of the buckling pattern in the x-direction at this stage will be:

- \( \lambda = \pi \sqrt{D} \)
- \( \lambda = \pi \sqrt{2D} \)
- \( \lambda = 2\pi \sqrt{D} \)
- \( \lambda = 2\pi \sqrt{2D} \)

No, the answer is incorrect.
Score: 0
8) Select the correct option from A, B, C and D.

**Statement 1:** The governing equation for buckling of plates is the same as that for loaded plates based on undeformed geometry.

**Statement 2:** To develop governing equation for buckling in composite plate we have to disturb the original position of plate slightly and then develop equilibrium equation in disturbed state.

- A) Both statements are true and Statement 2 is correct explanation for Statement 1.
- B) Both statements are true but Statement 2 is not correct explanation for Statement 1.
- C) Statement 1 is correct and Statement 2 is incorrect.
- D) Statement 1 is incorrect but Statement 2 is correct.

No, the answer is incorrect.
Score: 0

9) Calculate the force ‘N’ applied to square composite plate [0/90/0] with simply supported edges as shown in the following figure so that it just starts to buckle. The [Q] matrix for the material is given as follows. Also the thickness of each lamina is 1 mm and side \(a = 1\) m. Assume a one-term solution.

\[
\begin{bmatrix}
126.68 & 3.10 & 0 \\
3.10 & 11.07 & 0 \\
0 & 0 & 6.60
\end{bmatrix}
\]

- A) 3.78 kN/m
- B) 5.35 kN/m
- C) 7.50 kN/m
- D) 9.15 kN/m

No, the answer is incorrect.
Score: 0

10) Consider a rectangular, symmetric and specially orthotropic plate which is simply supported on all of its edges. The plate is under bi-directional compression as shown below in the figure. Assume that the length and the width of the plate are \(a\) and \(b\), respectively. Also \(a/b = R\), \(D_{11} = D_{22} = D_{12} + 2D_{66} = D\). Then for such a plate, buckling force resultant \(N\) will __________.
None of these are true.

No, the answer is incorrect.
Score: 0

Accepted Answers:
increase with increase in aspect ratio R.