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Unit 5 - Week 3 : Analytical Solution - Navier and Levy for Bending Case

Assignment No. 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2018-09-12, 23:59 IST.**

1) The governing equation for bending of a panel is given by $D_{11}w_{,xxxx} = q$. It is subjected to a uniformly distributed load $q = q_0$ and is simply supported along the edges at $x = 0$ and $x = a$, then the deflection function of the panel is given by ***1 point***

- $\frac{q_0 a^4}{24 D_{11}}\left[\left(\frac{x}{a}\right)^2 - 2\left(\frac{x}{a}\right)^3 + \left(\frac{x}{a}\right)\right]$
- $\frac{q_0 a^3}{24 D_{11}}\left[\left(\frac{x}{a}\right)^4 - 2\left(\frac{x}{a}\right)^3 + \left(\frac{x}{a}\right)^2\right]$
- $\frac{q_0 a^4}{12 D_{11}}\left[\left(\frac{x}{a}\right)^4 - 2\left(\frac{x}{a}\right)^3 + \left(\frac{x}{a}\right)^2\right]$
- $\frac{q_0 a^4}{24 D_{11}}\left[\left(\frac{x}{a}\right)^4 - 2\left(\frac{x}{a}\right)^3 + \left(\frac{x}{a}\right)\right]$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{q_0 a^4}{24 D_{11}}\left[\left(\frac{x}{a}\right)^4 - 2\left(\frac{x}{a}\right)^3 + \left(\frac{x}{a}\right)\right]$

2) For an isotropic $(\nu = 0.3)$ simply supported square plate which is subjected to a sinusoidally distributed transverse load of intensity q_0. The maximum transverse deflection is given by ***1 point***

- $0.256\left(\frac{q_0 a^4}{D}\right)$

$2.56\left(\frac{q_0 a^4}{D^2}\right)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$0.00256\left(\frac{q_0 a^4}{D}\right)$

3) For an isotropic $(\nu = 0.27)$ simply supported square plate which is subjected to a sinusoidally distributed transverse load of intensity q_0. The maximum bending moment M_{xx} is given by **1 point**

$0.3216 q_0 a^2$

$0.06432 q_0 a^2$

$0.03216 q_0 a^2$

$0.03216 q_0 a$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$0.03216 q_0 a^2$

4) A all round simply supported isotropic square plate subjected to the same magnitude of the uniform compressive force N_{xx}, N_{yy} on both the edges. For $m = n = 1, D = 5Pa - m^3, b = 2m$ the critical buckling load (Nm^{-1}) will be **1 point**

24.674

21.345

25.7

2.4674

No, the answer is incorrect.
Score: 0

Accepted Answers:
24.674

5) An orthotropic all round simply supported (Navier Supports) square plate is subjected to the same magnitude of the uniform compressive force N_{xx}, N_{yy} on both the edges. **1 point**

For $m = n = 1$, $\frac{\hat{D_{12}}}{D_{22}} = 1$ and $\frac{D_{11}}{D_{22}} = 25$. The value of the critical load (Nm^{-1}) will be

$13.8174 \frac{D_{22}}{a^2}$

$148.174 \frac{D_{22}}{a^2}$

$138.174 \frac{D_{22}}{a^2}$

$12.8174 \frac{D_{22}}{a^2}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$138.174 \frac{D_{22}}{a^2}$

6) Two isotropic square plates A and B have same density and dimension. For plate A Young's modulus $E_A = 210GPa$,Poisson's ratio $\nu = 0.3$ and for plate B $E_B = 70GPa, \nu = 0.25$. Then the ratio of frequency of plate A to the plate B after neglecting rotatory inerta I_2 will be
(Note: consider plate is subjected to Navier type support conditions) ***1 point***

2.2

1.792

17.92

3.456

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.792

7) A all round simply supported isotropic plate has density $\rho = 1200kg - m^{-3}$, bending stiffness $D = 7Pa - m^3, h = 1mm, a = 2m$. Then the fundamental frequency$(radsec^{-1})$ for $m = n = 1$ by neglecting rotatory inertia I_2 is given by ***1 point***

11.91

1.192

2.75

3.645

No, the answer is incorrect.
Score: 0

Accepted Answers:
11.91

8) An isotropic square plate is subjected to uniformly distributed load $q(x, y) = q_0$.For poission's ratio $\nu = 0.3$ and $m = n = 1$. If plate is subjected to Navier supports then the maximum bending moment M_{xx} will be ***1 point***

$0.267q_0a^2$

$0.533q_0a^2$

$0.0533q_0a^2$

$2.376q_0a^2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$0.0533q_0a^2$

9) An isotropic square plate subjected to uniformly distributed load $q(x,y) = q_0$. For $b = 1m, D = 5Pa - m^3, E = 210GPa, \nu = 0.28, m = n = 1$ the maximum bending stress σ_{xx} for $1mm$ thick all round simply supported plate will be *1 point*

$119.768 * 10^3 q_0$

$119.76 * 10^6 q_0$

$1197.686 * 10^6 q_0$

$1197.686 * 10^3 q_0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$1197.686 * 10^3 q_0$

10) All sides of an isotropic square plate are simply supported. The ratio of the fundamental frequency $(m = n = 1)$ to the frequency for $m = n = 2$ after neglecting rotatory inertia I_2 will be *1 point*

0.5

0.25

0.75

1

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.25

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