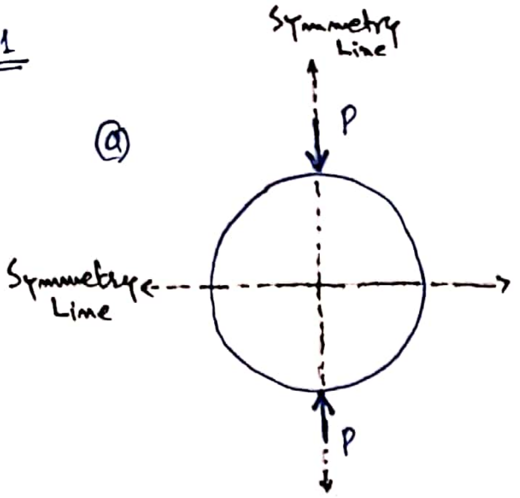
ADNAN ALI IMRAN

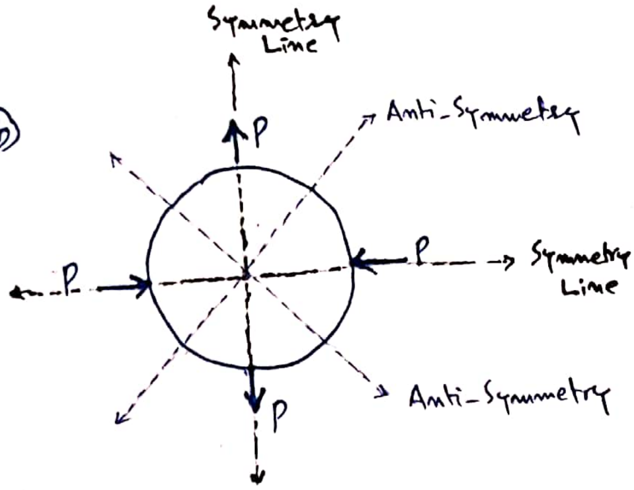
Assignment No. 2.1 CSMD

Part - 1

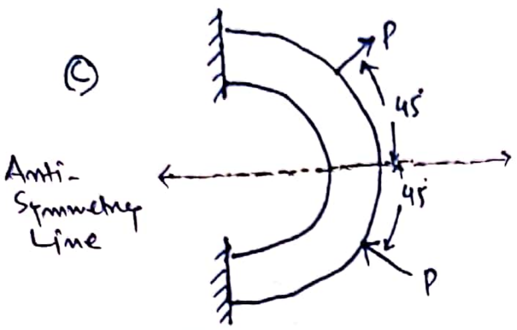
(a)



(b)



(c)



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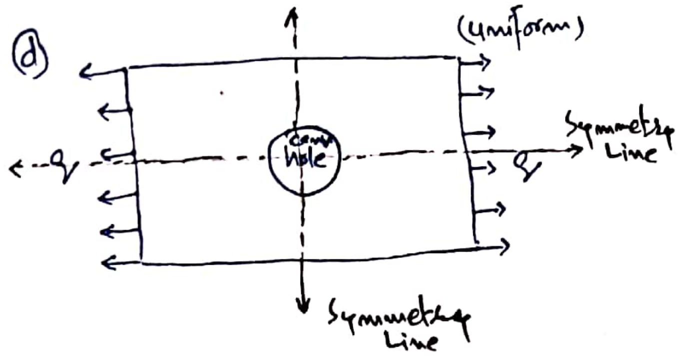
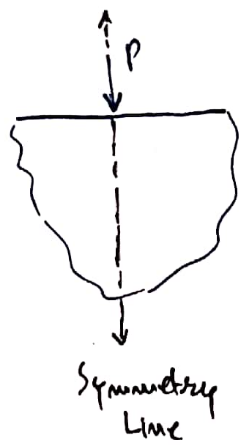
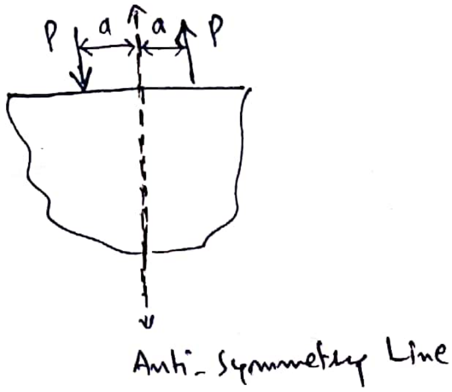


(e)

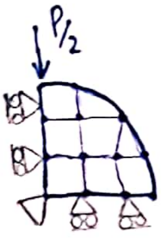


(f)

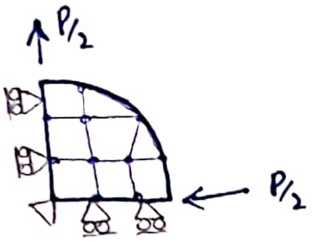


Part-2

ⓐ



ⓑ



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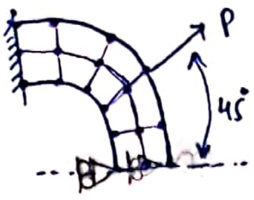

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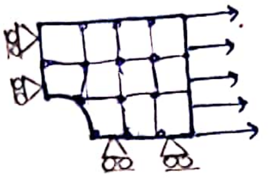

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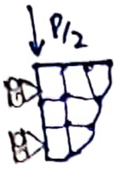
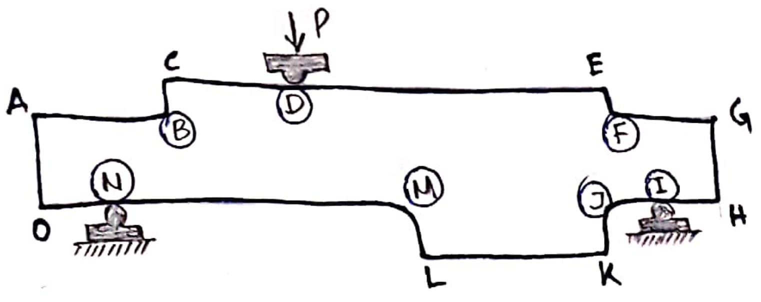


ⓕ

Assignment 2.2



D = Concentrated Applied (Vicinity of pt. D)

N, I = Concentrated Reactions (Vicinity of pt. N & pt. I)

B, F, M, J = Corner point (Stress Concentrations)

Assignment. No. 2.3

③

$$A = A_i(1-\xi) + A_j\,\xi$$

$$q = \rho A \omega^2 x$$

As we know Axial force is given along the lengthe x the Node (Consistent) force is given by

$$f = \int_0^1 q \begin{bmatrix} 1-\xi \\ \xi \end{bmatrix} l\, d\xi \qquad \because \text{As} \quad \xi = \frac{x - x_1}{l} \quad \text{where } x_1 = 0$$

$$x = \xi l$$

So

$$f = \int_0^1 \rho\omega^2 x \left(A_i(1-\xi) + A_j\xi \right) \begin{bmatrix} 1-\xi \\ \xi \end{bmatrix} . l\, d\xi$$

$$f = \rho\omega^2 l^2 \int_0^1 \xi\left(A_i(1-\xi) + A_j\xi \right) \begin{bmatrix} 1-\xi \\ \xi \end{bmatrix} d\xi$$

$$f = \rho\omega^2 l^2 \int_0^1 \begin{bmatrix} A_i(\xi - 2\xi^2 + \xi^3) + A_j(\xi^2 - \xi^3) \\ A_i(\xi^2 - \xi^3) + A_j\,\xi^3 \end{bmatrix} d\xi$$

$$f = \rho\omega^2 l^2 \begin{bmatrix} A_i\left(\frac{1}{2} - \frac{2}{3} + \frac{1}{4}\right) + A_j\left(\frac{1}{3} - \frac{1}{4}\right) \\ A_i\left(\frac{1}{3} - \frac{1}{4}\right) + A_j\left(\frac{1}{4}\right) \end{bmatrix}$$

$$f = \rho\omega^2 l^2 \begin{bmatrix} A_i\left(\frac{1}{12}\right) + A_j\left(\frac{1}{12}\right) \\ A_i\left(\frac{1}{12}\right) + A_j\left(\frac{1}{4}\right) \end{bmatrix}$$

As $A_i = A_j = A$

$$f = \rho\omega^2 l^2 \begin{bmatrix} \frac{1}{6}A \\ \frac{1}{3}A \end{bmatrix} \Rightarrow f = \frac{\rho\omega^2 l^2 A}{6} \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$