

Exam 11/05/20 13:00 - 15:00
Advanced Stress Analysis + FEA
(M6X00420)

Sion Evans (P150600) 2/20

Two

b i) $30 \times 10^3 \times 20 \times 10^3 \text{ m}$ Thickness $2.5 \times 10^{-3} \text{ m}$
 $L = 2.4 \text{ m}$ $\sigma = 480 \times 10^6 \text{ Pa}$ $E = 190 \times 10^9$

$$U = \frac{P^2 L}{2AE} = \frac{\sigma^2 AL}{2E}$$

$$A = (25 \times 10^{-3})(15 \times 10^{-3})$$
$$= 3.75 \times 10^{-4} \text{ m}^2$$

$$A = (30 \times 10^{-3})(20 \times 10^{-3}) = 3.75 \times 10^{-4}$$

$$U = \frac{(480 \times 10^6)^2 (2.25 \times 10^{-4})(2.4)}{(2)(190 \times 10^9)}$$

$$= \underline{\underline{2.25 \times 10^{-4} \text{ m}^2}}$$

$$= \underline{\underline{327.41 \text{ J}}}$$

ii) $P.E = mgh$ $U = \frac{P^2 L}{2AE}$ $P.E = U$

$$Mgh = \frac{P^2 L}{2AE}$$

$$P = \sigma A$$

$$Mg = W$$

$$Wh = \frac{\sigma A^2 L}{2AE} = \frac{\sigma AL}{2E}$$

$$AL = V$$

$$h = \frac{\sigma V}{2WE}$$