

1) A shear wall in a reinforced concrete building is subjected to a vertical load  $q$  and a horizontal force  $H$ , as shown in Fig. 1. As a consequence, the stresses at point A on the surface of the wall have compressive stress equal to 1400 MPa due to  $q$  and shear stress equal to 240 MPa due to  $H$ .

- Determine the principal stresses by the Mohr Circle Method and show them on a sketch of a properly oriented element. (20%)
- If the shear wall has very little resistance to tensile stress, what will be the cracking angle in the above loading? Show it in a graph. (10%)

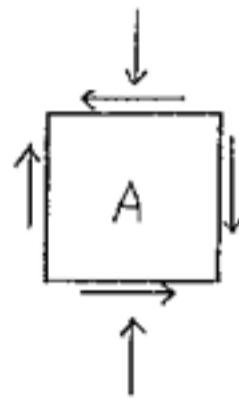
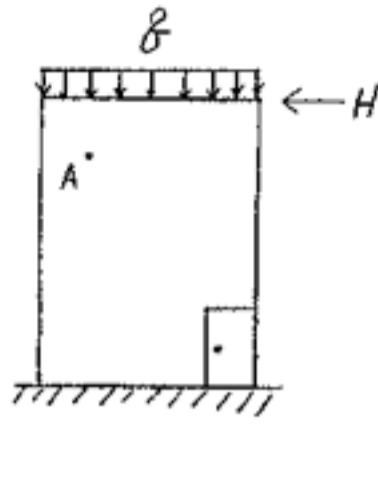


Fig. 1

2) Fig. 2 shows a bracket under a loading  $P$ . Determine the resultant normal stresses at A and B when the applied load  $P = 10$  kips. (20%)

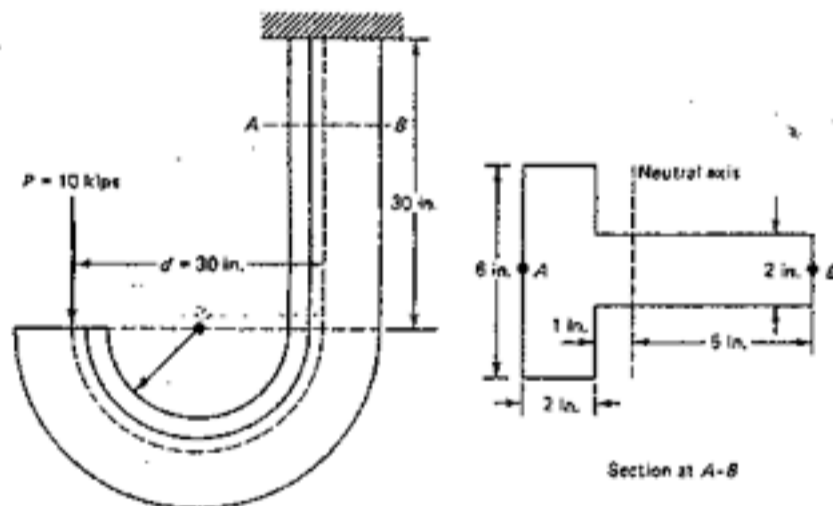


Fig. 2

3) Explain the following terms in less than 100 words each. (Chinese is acceptable and figures may be used) (30%)

- Strain Hardening
- Bifurcation Point
- Resonance
- Neutral Axis
- Euler Load

4) Solve the following math problems. (20%)

- The inverse matrix of

$$\begin{bmatrix} 2 & 1 & 2 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

- The solution of

$$y'' + 3y' - 4y = 0 \text{ 當 } x=0 \text{ 時 } y=4, y'=-2$$