

Notes by-

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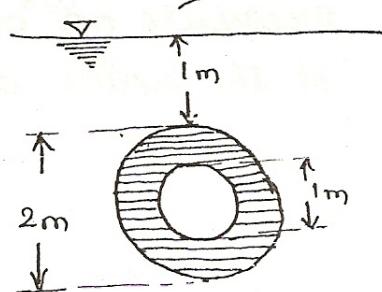
① Determine the total force and its point of application, for 1m wide and 2m deep rectangular plane area immersed vertically with its top edge 1.5m below the water surface. $[F_p = 49.05 \text{ kN}; \bar{h} = 2.63 \text{ m}]$

② Determine the total force and location of centre of pressure for a circular plate of 2m diameter immersed vertically in water with its top edge 1.0m below the water surface. $[F_p = 61.63 \text{ kN}; \bar{h} = 2.196 \text{ m}]$

③ Determine the total force and position of centre of pressure for annular ring.

$$[F_p = 46.23 \text{ kN}; \bar{h} = 3.56 \text{ m}]$$

$$\begin{aligned} P &= \gamma A \bar{h} \\ &= 9.81 \left[\frac{\pi}{4} (D^2) - \frac{\pi}{4} (d^2) \right] \times (1+1) \\ &= 46.23 \text{ kN} \end{aligned}$$



④ Determine the total force and position of centre of pressure for a trapezium of sides 2m and 4m and height 3m, immersed in water at 30° inclination with the top edge 1m below water surface.

$$[P = 162.01 \text{ kN}; \bar{h} = 2.004 \text{ m}]$$

⑤ The upstream face of dam follows the equation $y = x^2$ from the ground surface. If the depth of water is 9m find the hydrostatic pressure.

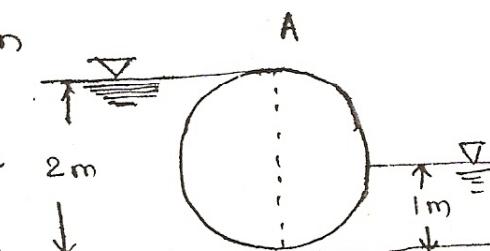
(CE III 1996) Mark 10

⑥ A cylindrical gate is 3m long and $[P = 434.77 \text{ kN}; \theta = 23^\circ 57' 44"]$

has water on its both sides as shown

Determine the magnitude, location and direction of the resultant

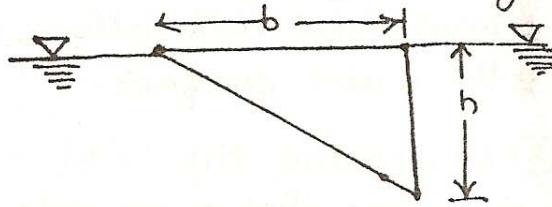
hydrostatic force exerted on the gate. Also calculate the minimum weight of the gate so that it will not float away from the floor.



$$F_r = 82.19 \text{ kN} \quad \theta = 32.5^\circ \text{ with } +$$

⑦ Determine the centre of pressure for the vertical area of triangular shape shown in the following figure.

$$[x_p = \frac{b}{4}; y_p = \frac{h}{2}]$$



⑧ A circular plate 2.5m diameter is immersed in water, its greatest and least depth below the free surface being 3m and 1m respectively. Find total pressure on one face of the plate and the position of the centre of pressure.

$$[P = 96.315 \text{ kN}, \bar{h} = 2.07 \text{ m}]$$