2. A vertical wall acts as a dam between fresh water (density $1000 \mathrm{~kg} / \mathrm{m}^{3}$ ) and sea water (density $1030 \mathrm{~kg} / \mathrm{m}^{3}$ ) on the other side. The depths are 2 m and 3.5 m respectively. Calculate the resultant force and resultant turning moment about the base for a init width.

## FRESH WATER

$\mathrm{R}=\rho \mathrm{gA} \overline{\mathrm{y}}$ and $\overline{\mathrm{y}}=\mathrm{h} / 2=2 / 2=1$
$\mathrm{R}=1000 \times 9.81 \times 2 \times 1=19620 \mathrm{~N}$
$\mathrm{M}=\mathrm{R} \mathrm{A} \quad \mathrm{A}=(2-\overline{\mathrm{h}})$ In this case $\overline{\mathrm{h}}=2 \mathrm{~h} / 3$
$\mathrm{M}=19620(2 / 3)=13080 \mathrm{Nm}$


SALT WATER
$\mathrm{R}=\rho \mathrm{gA} \overline{\mathrm{y}}$ and $\overline{\mathrm{y}}=\mathrm{h} / 2=3.5 / 2=1.75$
$\mathrm{R}=1030 \times 9.81 \times 3.5 \times 1.75=61889 \mathrm{~N}$
$\mathrm{M}=\mathrm{R} B \quad \mathrm{~B}=(3.5-\overline{\mathrm{h}})$ In this case $\overline{\mathrm{h}}=2 \mathrm{~h} / 3$
$\mathrm{M}=61889 \times 1.1667=72204 \mathrm{Nm}$
Resultant Force $=61889-19620=42269 \mathrm{~N}$ (acting right to left)
Resultant Moment $=72204-13080=59124$ Nm (acting anti clockwise)

