Question 1 (10 Marks):

Answer by true (**T**) or false (**F**) to the **left** of the question.

In the Hydrostatic Pressure on a plane surface Experiment:

(   )   The surface under study has the shape of toroid.

(   )   The rider weight balances the weight of the toroid in the dry situation only.

(   )   The location of the center of pressure changes if a different fluid was used in the tank.

(   )   The center of pressure in an immersed body is always below the centriod.

In the Hydraulic Jump Experiment:

(   )   The energy under the sluice gate equals to the energy after the gate.

(   )   The height of the hydraulic jump increases as Froud number increases.

(   )   The energy loss in the jump is zero.

In the Impact of Water Jet Experiment:

(   )   The Force on the flat plate is less than the force on the hemispherical cup.

(   )   The force generated is calculated by taking the moment about the center of the jet.

(   )   The water flow rate is measured using weighing tank.

Question 2 (10 Marks):
The following data was taken during the experiment of centrifugal and reciprocating pumps:

	Centrifugal	Reciprocating
Motor speed (rev/s)	12	15
Pressure difference	0.3	0.5
Load on dynamometer(kg)	1.47	0.75
Volume of water in the tank (liter)	10	10
Time to fill the tank (sec.)	44	27
Water density (kg/m^3)	1000	1000

Calculate the following for **each** pump:
a) Water power.
b) Brake power.
c) Overall efficiency.
d) Volumetric efficiency.

Hint: use the following equations:

Water power= $\rho g Q h_p$,   Break power = $2\pi \omega FR$, $Q_c = 2A_pL\omega$, $Q_c = \dfrac{0.75}{12.5} \times 10^{-3}\, \omega$

R= 0.15m , A_p= 15.55 × 10^{-4} m^2 , L= 0.0413 m .