5) $Q = 0.05 dm^3/sec = 8.33 \times 10^{-5} m^3/sec$

Speed of rotation = 1700 rev/min = 28.3 rev/sec

Normal displacement = 100 cm^3/rev = 10.5 m^3/rev

Torque input = 15 Nm

Pressure Charge = 15 bar = $15 \times 10^5 N/m^2$

Ideal flow rate = normal displacement × speed of rotation

$= 10^{-5} \times 28.3 = 2.83 \times 10^{-4} m^3/sec$

Efficiency = $\frac{\text{Actual flowrate}}{\text{Total flowrate}} \times 100$

$= \frac{8.33 \times 10^{-5}}{2.83 \times 10^{-4}} \times 100 = 29.45\%$

b. fluid power, $P = Q \times \Delta P$

$= 8.33 \times 10^{-5} \times 15 \times 10^5 = 124.95$ watts

c. Shaft power = $T \times \omega$

$\omega = 2\pi \times$ speed of rotation $= 2\pi \times 28.3$

$= 177.81$ rad/sec

$= 15 \times 177.81 = 2667.2$ watts

d. Overall efficiency = $\frac{\text{fluid power}}{\text{Shaft power}} \times 100$

$= \frac{124.95}{2667.2} \times 100$

$= 4.68\%$.

4) Axis = 1.5m

D = 0.1m

S_g of Hg = 13.6

S_g of Sample = 1.026

$$h = 0.1\left(\frac{13.6}{1.026} - 1\right)$$

$= 2.083m$

$V = \sqrt{2gh}$

$= \sqrt{2 \times 9.81 \times 2.083} = 6.39 m/s$

2) Inlet diameter = 0.2m

Throat diameter = 0.1m

Cd = 0.98

$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.2^2}{4} = 0.0314 m^2$

$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.1^2}{4} = 7.85 \times 10^{-3} m^2$

$h = \frac{P_1}{w} - \frac{P_2}{w}$

$\frac{P_1}{w} = \frac{1.765 \times 10^{-2} N/m}{9.81}$

$= 1.799 \times 10^{-3}$

$\frac{P_2}{w} = 0.3 \times 13.6 = -4.08$

$h = \frac{P_1}{w} - \frac{P_2}{w} = 1.798 \times 10^{-3} - (-4.08)$

$= 4.082m$

$Q = \frac{0.98 \times 0.0314 \times 7.85 \times 10^{-3} \times \sqrt{2 \times 9.81 \times 4.083}}{\sqrt{(0.0314)^2 - (7.85 \times 10^{-3})^2}}$

$Q = \frac{0.00024165 \times 8.9.44}{\sqrt{0.00092}}$

$Q = \frac{0.0216}{0.0303}$

5) Q = 0.0

Speed of

Normal

Torque

Pressure

Heel

$= 10^{-5} \times$

Effe

b. fluid po

=

C. Shaft pow

W = 2

= 177

= 1

d. Overall

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Computer Engineering

1) $L = 20m$
$V_1 = 5 m/s$
$V_2 = 2 m/s$
$Q = \frac{0.35(V_1 - V_2)^2}{2g}$

$Ph = 2.5$

$\frac{P_e}{N} = \frac{P_1}{N} + \frac{(V_1^2 + V_2^2)}{2g} + (Z_1 - Z_2)L$

$= 2.5 + \frac{5^2 - 2^2}{2 \times 9.81} + 2 - \frac{(0.3(5-2)^2)}{2 \times 9.81}$

$= 2.5 + 1.07 + 2 - 0.16055$

Pressure at base head $= 5.41 bar$

3) $D_1 = 0.15m$, $D_2 = 0.3m$
$Cd = 0.64$

$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.15^2}{4} = 0.0176 m^2$

$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.3^2}{4} = 0.07069 m^2$

$L = 0.5\left(\frac{136}{0.9} - 1\right) = 7.05m$

$Q = \frac{cdA_1A_2}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh}$

$= \frac{0.64 \times 0.0176 \times 0.07069 \times \sqrt{2 \times 9.81 \times 7.05m}}{\sqrt{(0.0176)^2 - (0.07069)^2}}$

$= \frac{0.006 A6 \times 11.769}{\sqrt{0.00063 - 0.00499}}$

$= 0.137 6 m^3/s$