Answer All Questions

QUESTION 1

A solid circular cylinder of diameter *a* is immersed in a constant free stream velocity *U*. Assume flow to be ideal.

a) Derive the stream function, Ψ to represent this flow

(3 marks)
(CO1 / PO1 / C3)

b) If the diameter of the cylinder is 40 *mm* and the free stream velocity is 1.0 ms^{-1}, determine the radial and normal components of velocity at a point on a streamline where $r = 50$ *mm* and $\theta = 135^{\circ}$.

(2 marks)
(CO1 / PO1 / C3)

QUESTION 2

A centrifugal pump supplies water at the rate of 750liter/s against manometric head of 15m of water. Pump running at 800rpm. A loss in pump is given by $0.03V_2^2$ where V_2 is absolute water velocity at impeller out. Manometric efficiency of the pump is 85%. If the flow velocity is constant at 3 ms^{-1} and assumed zero whirl at inlet, determine

a) Blade angle at outlet

(3 marks)
(CO2 / PO2 / C4)

b) Impeller diameter at outlet

(2 marks)
(CO2 / PO2 / C4)