**Question #1**

Give the definition of the internal flow, the entrance region. Explain the difference between laminar and turbulent flow.

**Question #2**

Derive the relationship between flow rate and pressure gradient for fully developed laminar flow between infinite parallel plates, when:

1. Both plates are stationary
2. Upper plate moves with constant speed U

Derive the expression for shear stress distribution.

**Question #3**

Derive the relationship between flow rate and pressure gradient for fully developed laminar flow in a pipe. Derive the expression for shear stress distribution.

**Question #4**

Derive the expression for turbulent velocity profiles in fully developed pipe flow.

**Question #5**

Derive the expression for energy, kinetic energy coefficient and head loss in pipe flow.

**Question #6**

Derive the expression for major head losses, friction factor in pipe flow.

**Question #7**

Derive the expression for minor head losses in pipe flow.

**Question #8**

Derive the expression for head loss produced by pumps, fans and blowers in fluid systems.

**Question #9**

Calculate the hydraulic diameter of circular and rectangular ducts.

**Question #10**

Explain the boundary layer concept.

**Question #11**

Derive the exact solution for laminar flat plate boundary layer.

**Question #12**

Derive the integral solution for laminar flat plate boundary layer.

**Question #13**

Derive the integral solution for flow with zero pressure gradient.

**Question #14**

Derive the drag coefficient for flow about immersed body.

**Question #15**

List the types of fluid machines.

**Question #16**

Derive the Euler Turbomachine Equation.

**Question #17**

Derive the expression for the hydraulic power.

**Question #18**

Derive the Euler Turbomachine Equation for Centrifugal Pumps.

**Question #19**

Derive the Euler Turbomachine Equation for Axial Flow Pumps and Fans.

**Question #20**

Explain the similarity rules for Turbomachines.

**Question #21**

Explain the pump selection procedure.

**Question #22**

Describe Blowers and Fans.

**Question #23**

Describe Propellers and Wind Turbines.

**Question #24**

Derive the Euler Turbomachine Equation for Compressible Flow Machine.

**Question #25**

List geometries of open channels.

**Question #26**

Derive the expressions of the speed of surface waves and Froude Number.

**Question #27**

Derive the energy equation for open-channel flows.

**Question #28**

Explain the localized effect of area change in open-channel flows.

**Question #29**

Explain the hydraulic jump in open-channel flows.

**Question #30**

Explain the discharge measurement procedure using weirs in open-channel flows.