JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year II Semester Examinations, June-2014
MECHANICS OF FLUIDS AND HYDRAULIC MACHINES
(Common to ME, MIE, MIM, MS & NT)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a)   Define surface tension and derive the equation for pressure intensity inside a liquid jet.

  b)   Explain the manometer that can be used for very precise measurement of small pressure difference between two points with a neat sketch.

2.   Water flows through a 0.9m diameter pipe at the end of which there is a reducer connecting to a 0.6m diameter pipe. If the gage pressure at the entrance to the reducer is 412.02 KN/m^2 and the velocity is 2m/s, determine the resultant thrust on the reducer assuming that the frictional loss of head in the reducer is 1.5m.

3.a)   The rate of flow of water through a horizontal pipe is 0.25m^3/s. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is 11.772N/cm^2. Determine loss of head due to sudden enlargement and pressure intensity in the large pipe.

  b)   A 30 cm×15 cm venturimeter is inserted in a vertical pipe carrying water flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. Find the discharge. Take $c_d = 0.98$.

4.   A plate 0.5m×0.2m has been placed longitudinally in a stream of crude oil which flows with undisturbed velocity of 6 m/s. Given that oil has a specific gravity of 0.9 and kinematic viscosity of 1 stoke, calculate the boundary layer thickness and shear stress at the middle of plate. Also, calculate friction drag on one side of the plate.

5.a)   List out the various types of hydro electric power plants and explain pumped storage plants in detail.

  b)   List out the various components of hydroelectric scheme and explain any two in detail.

6.a)   Explain the purpose of providing scroll casing stay vanes and guide vanes for a reaction turbine.

  b)   Give the classification of turbines.

7.   Compare the working of different turbines.

8.   A double acting reciprocating pump running at 40 rpm is discharging 1.0 m^3 of water per minute. The pump has a stroke of 400 mm. The diameter of the piston is 200 mm. The delivery and suction head are 20m and 5m respectively. Find the slip of the pump and power required to drive the pump.

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