Code No: ME1505

I B. Tech II Semester Supplementary Examinations, January 2017 FLUID MECHANICS AND HYDRAULIC MACHINES (Electrical and Electronics Engineering)

Time: 3 Hours

Note: All Questions from **PART-A** are to be answered at one place. Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

- 1. What is the difference between compressible and incompressible flow?
- 2. What are the various forces present in a fluid flow?
- 3. What do you understand by the term major energy loss and minor energy loss?
- 4. Write the difference between turbine and pump?
- 5. What is priming in Centrifugal pump and why it is necessary?
- 6. What is the maximum efficiency of the jet of water striking a series of vanes?

PART-B

$4 \times 12 = 48M$

- 1. a) Explain the terms:
 - (ii) Streak line, (iii) Stream line (iv) Stream tube (i) Path line. (4M)
 - b) The dynamic viscosity of oil, used for lubrication between a shaft and sleeve is 6 poise. The shaft is of 0.4m diameter and rotates at 190 rpm. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1.5 mm. (8M)
- 2. a) What is the difference between momentum equation and impulse momentum equation? (4M)
 - b) A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 meters at a higher level. If the pressure at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 liters/sec. Determine the loss of head and direction of flow. (8M)

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 $6 \times 2 = 12M$

Max. Marks: 60

- 3. a) Derive Darcy-Weisbach Equation.
 - b) At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow.
- 4. a) Derive the expression for the force exerted by jet on a stationary symmetrical curved vane at its centre. (6M)
 - b) A Jet of water having a velocity of 20m/sec strikes a curved vane which is moving with a velocity of 9m/sec. The vane is symmetrical and is so shaped such that the jet is deflected through 120°. Find the angle of the jet at inlet of the vane so that there is no shock. What is the absolute velocity of the jet at outlet in magnitude and direction and the work done per second per unit weight of the water striking? Assume the vane as smooth.
- 5. a) Derive the expression for maximum hydraulic efficiency for a Pelton wheel. (6M)
 - b) Two jets strike the buckets of Pelton wheel, which is having shaft power as 15MW. The diameter of each jet is given as 15 cm. If the net head on the turbine is 500 m, find the overall efficiency of the turbine. Take $C_v = 1.0$.

(6M)

- 6. a) Explain about different types of heads in centrifugal pumps with neat sketch. (4M)
 - b) Explain the components and working of a Reciprocating pump with a neat sketch and derive the equation for discharge from the Reciprocating pump.
 (8M)
