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Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, FEBRUARY 2013

AM/ME 04 406 – FLUID MACHINERY

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

I. (a) What is the difference between momentum equation and impulse momentum equation?

(b) Explain the different types of hydraulic similarities that must exist between a prototype and its model.

(c) What are the causes of cavitation?

(d) Define specific speed of a turbine and give its uses.

(e) What is priming and why it is necessary in centrifugal pumps?

(f) Differentiate between the volute casing and vortex casing for the centrifugal pump.

(g) Explain the difference between a fluid coupling and fluid torque converter.

(h) What is a hydraulic intensifier?

(8 × 5 = 40 marks)

II. (a) A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assuming the smooth plate find: (i) Force exerted on the plate in the direction of jet ; (ii) Power of the jet ; and (iii) Efficiency of the jet.

Or

(b) State Buckingham's π theorem. Why this theorem is superior over the Rayleigh's method for dimensional analysis?

III. (a) Define specific speed of a turbine and derive an expression for the same. Show that Pelton turbine is a low specific speed turbine.

Or

(b) A Kaplan turbine working under a head of 25 m develops 16000 kW shaft power. The outer diameter of the runner is 4 m and hub diameter is 2 m. The guide blade angle is 35°. The hydraulic and overall efficiency are 90% and 85% respectively. If the velocity of whirl is zero at outlet, determine runner vane angles at inlet and outlet and speed of the turbine.

Turn over

IV. (a) A centrifugal pump is running at 1000 r.p.m. The outlet vane angle of the impeller is 45° and velocity of flow at outlet is 25 m/s. The discharge through the pump is 200 litres per second, when the pump is working against a total head of 20 m. If the manometric efficiency of the pump is 80%, determine (i) the diameter of the impeller ; and (ii) the width of the impeller at outlet.

Or

(b) What is cavitation and what are its causes? How will you prevent the cavitation in pumps?

V. (a) Derive an expression for the head lost due to friction in the delivery pipe of a reciprocating pump with and without an air vessel.

Or

(b) Draw a neat sketch and explain the principle and working of axial and radial piston pumps.

(4 × 15 = 60 marks)