C 48863 (Pages : 2) Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2008

ME/AM 04 406—FLUID MACHINERY

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

I. (a) Derive the continuity equation for a three dimensional flow.

(b) Find the force exerted on moving flat plate held normal to jet.

(c) Derive the Euler's equation.

(d) Explain the term specific speed of a turbine. Write the expression for specific speed of turbine.

(e) What is meant by whirling of fluid ?

(f) Briefly explain the working principle of centrifugal pump.

(g) What is the use of air vessels ?

(h) Describe the working of gear pump with a neat sketch.

(8 × 5 = 40 marks)

Part B

II. (a) (i) State and explain Bukingham Pi theorem. (8 marks)

(ii) Derive the condition for maximum efficiency when a jet of water strikes a series of flatvanes mounted on the periphery of a wheel.

(7 marks)

Or

(b) A jet of water 5 cm in dia having a velocity of 20 m/s strikes normally on a flat plate. Determine the thrust on the plate if :

(10 marks)

(i) The plate is at rest.

(ii) The plate is moving in the same direction as the jet with a velocity of 8 m/sc.

Write a note on propulsion of ship. (5 marks)

III. (a) Design a pelton turbine which is required to develop 2000 hp. The head on the turbine is 160 m and speed of the turbine is 420 r.p.m. The overall efficiency of the turbine is 85%. Assume other data required, jet ratio is 12.

(15 marks)

Or

Turn over

(b) (i) Write a note on the characteristic curves of turbine. (5 marks)

(ii) Describe the constructional features of Kaplan turbine. (10 marks)

IV. (a) (i) A centrifugal pump having an external and internal diameter of 1.25 m and 0. 5 m respectively is discharging water at a rate of 2000 litres/second against the head of 16 m when ruming at 300 r.p.m. The vanes are curved back at an angle of 30° with tangent at outlet and velocity of flow is constant at 2.5 m/s. Find (1) efficiency of pump ; (2) power required.

(10 marks)

(ii) Define a manometric head. (5 marks)

Or

(b) Describe the pump characteristics selection of pump and the types of centrifugal pump.

(15 marks)

V. (a) (i) Write a brief note on jet pump. (5 marks)

(ii) A single acting reciprocating pump has a plunger dia of 20 cm. and stroke length of 30 cm. The suction head is 10 cm dia and 8 cm long. The pump draws water 4 m below the axis of pump at 30 r.p.m. Find the pressure head (1) at the beginning of the suction stroke (2) at the middle of suction stroke. Assume friction factor 0.04, atm pressure 10.3 of water.

(10 marks)

Or

(b) Explain :

(i) Intensifier.

(ii) Accumulator.

(15 marks)

[4 × 15 = 60 marks]