

**FOURTH SEMESTER B. TECH. (ENGINEERING) DEGREE
EXAMINATION, JUNE 2010**

ME/AM 04 406 - FLUID MACHINERY

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

- I. (a) Find the force exerted on moving flat plate held normal to jet.
 (b) Find the force exerted by a 75 mm dia jet on a stationary flat plate. Jet moves with a velocity of 40 m/sec.
 (c) Explain inlet and outlet velocity triangle.
 (d) Write short notes on governing of turbines.
 (e) Describe the working of centrifugal pump.
 (f) What is meant by whirling of fluid?
 (g) With a neat sketch define hydraulic break.
 (h) Explain an indicator diagram.

(8 × 5 = 40 marks)

Part B

- II. (a) A nozzle of 55 mm diameter delivers a stream of water of 25 m/s perpendicular to a plate that moves away from the jet at 5 m/s., find
1. The force on the plate ;
 2. The work done ; and
 3. The efficiency of the jet.

(15 marks)

Or

- (b) 1. Derive the Euler's equation.
 2. Derive the continuity equation for three dimensional flow.

(8 + 7 = 15 marks)

- III. (a) 1. The inlet and outlet diameter of an inward flow reaction turbine are 3.5 m and 2.5 m, the width at inlet as well as outlet being 550 mm. The guide blade angle is 22°. The inlet vane angle is 94°. The turbine run at 160 r.p.m. Find the discharge of the turbine, the runner power developed and the Vane angle at outlet. Assume that the turbine is discharging radially at outlet.

Turn over

2. Describe the working of a Francis turbine.

(10 + 5 = 15 marks)

Or

- (b) 1. A hydraulic turbine, working under a head of 180 m, run at 325 r.p.m. the discharge of the turbine being 0.11 Cumec. The overall efficiency of the turbine is 84%. Find the specific speed of the turbine.
2. Describe the types of draft tube in detail.

(5 + 10 = 15 marks)

- IV. (a) A centrifugal pump having outer ϕ equal to the two times the inner ϕ and running at 1,000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. The outer diameter of the impeller is 500 mm and width at outlet is 50 mm. Determine (i) Vane angle at inlet, work done/s, Manometric efficiency.

(15 marks)

Or

- (b) 1. Briefly discuss the various types of pumps and their suitability for power hydraulic system.
2. Write the sequence of operations to select a pump for hydraulic system.
3. What are the three efficiencies of positive displacement pump?

(6 + 6 + 3 = 15 marks)

- V. (a) The cylinder bore diameter of a single acting reciprocating pump is 150 mm and its stroke is 300 mm. The pump run at 50 r.p.m. and lift water through a height of 25 m. The delivery pipe is 22 m long and 100 mm in ϕ . Find the theoretical discharge and the theoretical power required to run the pump. If the actual discharge is 4.2 l/s. Find the percentage slip. Also determine the acceleration head at the beginning and middle of delivery stroke.

Or

- (b) Describe the following :

- (i) Gear pump.
- (ii) Radial piston pump.

(15 marks)

[4 × 15 = 60 marks]