

C 58184

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Name: .....

Reg. No: .....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
JUNE 2009**

**ME/AM 04 406—FLUID MACHINERY**

**(2004 Admissions)**

**Time : Three Hours**

**Maximum : 100 Marks**

*Answer all questions.*

**Part A**

- I. (a) State and explain Buckingham Pi theorem.  
(b) Find the force exerted on moving flat plate held normal to jet.  
(c) Explain the type of draft tubes.  
(d) Explain the propulsion of ship.  
(e) Explain the features of positive displacement pump.  
(f) List the factor to be considered in the selection of pumps and actuator in the reference to a typical application.  
(g) Discuss the application of the accumulator.  
(h) Explain the operation of the hydraulic ram.

8 × 5 = 40 marks)

**Part B**

- II. (a) (1) A jet of water moving at a velocity of 30 m/sec impinges on a series of vanes moving at 15 m/sec. The jet makes an angle of 30° to the direction of motion of vanes at entry and leaves the vanes at 120°. Draw the inlet and outlet velocity triangle and determine :  
(i) Vane angles at inlet and outlet.  
(ii) Work done per second per Newton of water.  
(iii) The efficiency.

(10 marks)

- (2) Find the force exerted by a 75 mm dia jet on a stationary flat plate. Jet moves with a velocity of 40 m/sec.

(5 marks)

*Or*

- (b) (1) Derive the condition for maximum efficiency, when a jet of water strikes a series of flat vanes mounted on the periphery of a wheel.

(10 marks)

- (2) State impulse momentum principle and also its application.

(5 marks)

**Turn over**

- III. (a) (1) A Pelton wheel working under a head of 50 m is supplied with 0.85 cumic of water. The bucket speed is 15.5 m/sec. Find the power developed and the hydraulic efficiency of the turbine if the outlet vane angle is  $15^\circ$ . Take  $C_v = 0.98$ .

(10 marks)

- (2) Describe the working of a Francis turbine.

(5 marks)

Or

- (b) (1) Explain the term specific speed of turbine. Write the expression for specific speed of turbine.

(5 marks)

- (2) Explain with a neat sketch the governing of an impulse turbine.

(10 marks)

- IV. (a) (1) Define volumetric efficiency, mechanical efficiency and overall efficiency of a pump.

(6 marks)

- (2) What is pump performance ? How do you measure it ?

(6 marks)

- (3) How do you classify positive displacement pump ?

(3 marks)

Or

- (b) A centrifugal pump is required to lift water to a total head of 40m at a rate of 50 litres/sec. Find the power required by the pump if the overall efficiency is 62 %

(5 marks)

Write notes on :

- (i) Vortex motion.

- (ii) Whirling of fluid.

- (iii) Spiral flow.

(10 marks)

- V. (a) (1) Show that the work saved in overcoming friction in the pipe lines by fitting air vessels is 84.8% for a single acting pump.

(8 marks)

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

(7 marks)

Or

- (b) (1) Describe the working of a jet pump with a neat sketch.

(8 marks)

- (2) With a neat sketch explain screw pump.

(7 marks)

[4 × 15 = 60 marks]