B. E. (Sixth Semester) EXAMINATION, 2006
(Mechanical Engg. Branch)
FLUID MACHINERY
(ME-604)

Time: Three Hours  [ Maximum Marks: 100 ]

Note: Attempt any five questions.

1. (a) Classify various types of turbines.  10
    (b) Derive an expression for work done and efficiency of Pelton wheel.  10

2. (a) Explain in detail construction of Francis turbine and Kaplan turbine.  10
    (b) A Kaplan turbine produces 60000 KW under a net head of 26 m with an overall efficiency of 90%. Take speed ratio \( K_u \) as 1.6, Flow ratio \( \psi \) as 0.5 and hub diameter as 0.35 times the outer diameter. Find the diameter and speed of the turbine.  10

3. (a) Classify various types of reciprocating pumps.  6
    (b) A single acting reciprocating pump has a plunger of diameter 250 mm and stroke of 350 mm. If the speed of the pump is 60 r. p. m. and it delivers 16.5 l per second of water against a suction head of 5 m and a

P. T. O.
4. (a) Define the use of air vessels in detail.
(b) Explain negative slip and derive an expression for maximum speed of a reciprocating pump and coefficient of discharge.

5. (a) Classify centrifugal pumps and give advantages of centrifugal pumps over reciprocating pumps.
(b) What is Thoma's cavitation factor and model testing of pumps?

6. (a) Explain performance characteristics of pumps.
(b) A centrifugal pump has an impeller 0.5 m outer diameter and when running at 500 r.p.m. discharge water at rate 7500 l/min. against a head of 8.5. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m and the vanes are set back at outlet at an angle of 45° and the area of flow which is constant from inlet to outlet of the impeller is 0.05 m².

Determine (i) Manometric efficiency (ii) Vane angle at inlet (iii) Least speed at which the pump commences to work.

7. (a) Derive Euler's equation of motion.
(b) Comment on inclination of jet with the surface.
8. Write short notes on any four of the following: 5 each
   (i) Air lift pumps
   (ii) Intensifier
   (iii) Accumulator
   (iv) Hydraulic couplings
   (v) Jet pumps