

Printed Pages : 4

TME - 604

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4096

Roll No.

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B. Tech.**(SEM. VI) EXAMINATION, 2008-09****FLUID MACHINERY***Time : 3 Hours]**[Total Marks : 100***Note :** (1) Answer all questions.(2) All questions carry **equal** marks.

(3) Assume suitable wherever not provided.

(4) Give precise answer to the question.

1 Attempt any **two** parts of the following : **10×2=20**

(a) Calculate the efficiency of the system when jet strikes at the center of the curved plate.

(b) Derived the general expression of Euler's fundamental Equation.

(c) The blading of a single jet Pelton wheel runs at it's optimum speed which is 0.45 times the jet speed. The overall efficiency of the machine is 0.85. Show that the dimensionless specific speed is 0.1288 d/D rev, where d represents the jet diameter and D the wheel diameter. For the nozzle, the velocity coefficient $C_v = 0.97$.

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2 Attempt any **two** parts of the following : **10×2**

- (a) Differentiate propeller and Kaplan turbine with proper explanation.
- (b) Explain in detail :
 - (i) Specific speed
 - (ii) Cavitations in turbine
- (c) A Francis turbine develops 15 MW under a head of 200 m. The specific speed is 100, Overall efficiency=0.85 and the constant flow velocity equal to 10 m/s. The hydraulic efficiency=0.88, the ratio of width to diameter of wheel at inlet=0.1 and the area occupied by the thickness of blade = 5% of the area of water way. Estimate the area, guide blade angle, peripheral velocity, and velocity of whirl at inlet. Assume axial discharge.

3 Attempt any **two** parts of the following : **10×2**

- (a) Explain the working of a centrifugal pump with a sketch also define manometric head and manometric efficiency.
- (b) Explain :
 - (i) Difference between single stage centrifugal pump and multi stage centrifugal pump.
 - (ii) Difference between vane diffuser and vane less diffuser.

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- (c) A centrifugal pump has an impellor of 80 cm diameter and it delivers $1 \text{ m}^3/\text{s}$ against a head of 80 meter. The impeller runs at 1000 rpm and the width at outlet is 8 cm. If the leakage loss is 3% of the discharge, external mechanical loss is 10 kW and the hydraulic efficiency is 80%, Calculate the blade angle at outlet, the power required and the overall efficiency of the pump.

4 Attempt any **two** parts of the following : **10×2**

- (a) Explain the effect of the acceleration on the power requirement in a reciprocating pump with neat diagram.
- (b) Explain with neat sketch.
- (i) Vane pump
- (ii) Gear pump
- (c) A single acting single cylinder reciprocating pump has stroke length of 400 mm and piston diameter of 400 mm. The pump runs at 20 rpm. The suction and delivery head are 4 m and 20 m; the length of suction and delievery pipe are 6 m and 25 m and the diameter of suction and the delivery pipe is 200 mm. Estimate the power required to drive the pump if the coefficient of friction in pipe is ($f=0.02$).



- (a) Obtain the expression of the efficiency of hydraulic ram.
- (b) Explain the torque converter and fluid coupling with neat sketches.
- (c) Solve the following :
 - (i) Find the pressure in the small cylinder of an intensifier if the pressure in the larger cylinder is 5.4 MPa. The diameter of smaller and the large plunger of the intensifier are 100 mm and 300 mm respectively.
 - (ii) The displacement volume of an accumulator is 4 liter of water and diameter of its plunger is 375 mm, Find the length of the accumulator stroke.