Printed Pages : 4

EME-011

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

PAPER ID : 140651

Roll No.

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

FLUID MACHINERY

Time : **3** Hours]   [Total Marks : **100**

Note:

(1) Attempt all questions.

(2) All questions carry equal marks.

(3) Assume suitably, missing data, if any.

1   Attempt any four parts of the following:

    a.   Express the Euler Equation for machine.

    b.   What is impulse-momentum principle express and define?

    c.   What is the difference between the force of jet when it impinges on a single moving flat plate and the force of jet when it strikes on a series of moving plates?

d.   Derive an expression for force exerted by a jet on a fixed inclined plate. Also give an expression for a force exerted by jet on flat moving plate in the direction of jet.

e.   Explain construction and working of pelton wheel Turbine. Also how the speed of pelton wheel govern.

f.   Give "degree of reaction" for impulse and reaction turbine?

2   Attempt any four parts of the following:

a.   Explain governing Mechanism of Francis turbine?

b.   Why draft tube is used in reaction turbine? Derive an expiration to show that pressure of fluid after runner is less than atmospheric pressure.

c.   A model turbine, diameter of runner 380mm develops 9kw at a speed of 1500rpm under a head of 7.6m A geometrically similar turbine 1.9m runner diameter has to operate with same efficiency under a head of 15m. What speed and power would be expected?

d.   What is cavitation in turbine? Give its effect and methods of preventing cavitations in turbine, what is Thomas's cavitations factor?

e.   Deduce an expression for the specific speed of a hydraulic turbine and explain how it is useful in practice.

f.   A Kaplan turbine has the following specification
Rated discharge = $260m^3$/sec; head = 10m, speed = 80rpm; runner hub diameter = 2.3m; runner vane tip diameter = 6.7m; power produced = 18000kw; hydraulic efficiency = 85%. Find the flow ratio, overall efficiency, specific speed and the degree of reaction

3   Attempt any two parts of the following:

a.   Differentiate between Centrifugal & Reciprocating pump. Also derive an expression for starting speed of a Centrifugal pump.

b.   Explain the working of centrifugal pump with sketch also define manometric head and manometric efficiency.

c.   A centrifugal pump having outer dia. equal to two times of inner dia. and running at 1000rpm. Works against a total head of 40m the velocity of flow through the impeller is constant and equal to 2.5m/s the vanes are set back at an angle 40° at outlet. If the outer dia. of the impeller is 500mm and width at outlet is 50mm. Determine :

   i.   Vane angle at inlet

   ii.   Work done by the impeller on water per sec

   iii. Mechanical efficiency

4   Attempt any two parts of the following:

a.   A single acting reciprocating pump, running at 50rpm delivers 0.00736 m^3/s of water. The diameter of the piston is 200 mm and stroke length 300m. The suction and delivery heads are 3.5m and 11.5m respectively.

   Determine :

   I.   Theoretical discharge

   II.   Coefficient of discharge

   III. Percentage slip of the pump

   IV.   Power required to run the pump

140651]   3   [Contd...

b. Give the curve show the variation of discharge with crank angle for double acting reciprocating pump.

c. Prove that work done by the pump is proportional to the area of indicator diagram. What do you know about slip both positive and negative in a reciprocating pump?

5 Attempt any two parts of the following:

a. A hydraulic accumulator has ram of 30cm in diameter. Total weight of its movable parts is 50 Tonne and frictional resistance amounts to 5 Tonne. Find the intensity of pressure of water when,

I. Ram is ascending

II. Ram is descending

b. Give and explain the characteristic curve of a fluid coupling.

c. Define hydraulic Accumulator also derive an expression for capacity of hydraulic Accumulator

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