

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

PAPER ID : 2528

Roll No.

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B.Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

FLUID MACHINERY

Time : 3 Hours

Total Marks : 100

Note : (i) Attempt all questions.

(ii) All questions carry equal marks.

(iii) Assume missing data suitably, if any.

1. Attempt any **two** parts of the following : (2×10=20)
 - (a) How are fluid machines classified ? Write a brief note on each.
 - (b) Draw a general layout of an Impulse turbine plant. Explain gross head, net head, hydraulic, mechanical and overall efficiencies. Also draw a labelled sketch of a Pelton turbine.
 - (c) A Pelton turbine has a mean speed of 12.25 m/s at the pitch circle and takes 1370 litre/s, under a head of 30.5 m. The buckets deflect the jet through 160°. Calculate the power & hydraulic efficiency of turbine. Assume there are no frictional losses in bucket. Coefficient of Velocity for nozzle=0.98.

2. Attempt any **two** parts of the following : (2×10=20)
 - (a) Define the term degree of reaction used in hydraulic turbines. Explain the effect of vane inlet angle on the degree of reaction.

- (b) Answer the following :
- Define the term Unit Speed, Unit Power and Unit Discharge. Explain their significance.
 - Discuss the operating characteristics of various hydraulic turbines & compare their performances.
- (c) Under a discharge of 9000 litre/s and a head of 25m a turbine rotates at 200rpm. Assuming its overall efficiency of 90% find
- specific speed
 - power developed under a head of 20 m
 - the type of turbine.

3. Attempt any two parts of the following : (2×10=20)

- (a) Answer the following :
- Define the term specific speed of a centrifugal pump and deduce an expression for it.
 - A centrifugal pump running at 750 rpm and a head of 16m delivers 1500 litre/s of water, what type of centrifugal pump would you recommend ?
- (b) Explain the phenomenon of cavitation in centrifugal pump. List the factors that contribute towards the onset of cavitation. Also explain the maximum suction lift available.
- (c) (i) Discuss the necessity of having multistage pumps.
- (ii) A centrifugal pump is lifting water to height of 30m. Manometric efficiency of the pump is 70% and it is running at 1000 rpm. Assuming inside diameter of impeller is half that of outside diameter, calculate the least diameter of impeller to start the delivery of water.

4. Attempt any two parts of the following : (2×10=20)

(a) Answer the following :

(i) Explain the term slip with reference to reciprocating pumps. Why & When negative slip occurs ?

(ii) What are the advantages and disadvantages of reciprocating pumps over centrifugal pumps ?

(b) Explain why a gear pump is a rotary positive displacement pump. Describe construction and working of a gear pump.

(c) A reciprocating pump running at 60 rpm has plunger diameter of 250 mm, stroke of 450 mm, delivery pipe of 112 mm diameter and 48 m long. Find the power required to overcome the friction of delivery pipe when

(i) no air vessel is fitted and

(ii) air vessel is fitted at the centre line of pump. Pump is single acting. Take coefficient of friction=0.01

5. Attempt any two parts of the following : (2×10=20)

(a) With the help of a neat sketch explain the construction and operation of a hydraulic press.

(b) Explain with a neat sketch construction & operation of an air lift pump.

(c) Explain the working of a hydraulic intensifier with neat sketch.