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B.Tech. (Marine Engg.) (2013 Batch) (Sem.–6)
FLUID MACHINERY
Subject Code : BTME-603
Paper ID : [72851]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
 1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
 2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt ANY FOUR questions.**
 3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt ANY TWO questions.**

SECTION - A

 1. **Answer briefly :**

 a) How turbo-machines are classified?

 b) What is meant by cavitation?

 c) What is a reaction turbine?

 d) What is a draft tube?

 e) What is surge tank?

 f) Define overall efficiency of an impulse turbine.

 g) Define manometric head.

 h) What are submersible pumps?

 i) What do you mean by net positive suction head?

 J) What are the uses of air vessels?

SECTION - B

2. A jet of water of 20 mm diameter and moving at 15 m/s, strikes upon the centre of a symmetrical vane. After impingement, the jet gets deflected through 160° by the vane. Presuming vane to be smooth determine :

   a) The force exerted by the jet on the vane

   b) The ratio of velocity at the outlet to that at inlet if actual reaction of the vane is 127 N.

3. What is the purpose of draft tube in a hydraulic turbine and how does it operate?

4. A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 0.7 m³/s under a head of 30 m. The buckets deflect the jet through an angle of 165°. Calculate the power and the efficiency of the turbine. Assume co-efficient of velocity as 0.98.

5. How does a centrifugal pump input pressure energy to the fluid? Discuss the mechanism involved.

6. Describe the principle and working of a reciprocating pump.

SECTION - C

7. A Pelton wheel is to be designed for the following specifications:

   Power (brake or shaft):   9560 kW,   Head: 350 m,   Speed: 750 *rpm*,

   Overall efficiency: 85%,   Jet diameter: not to exceed l/6th of the wheel diameter

   Determine the following :

   a) The wheel diameter

   b) Diameter of the jet

   c) The number of jets required

      Take C_v = 0.985, Speed ratio = 0.45

8. A centrifugal pump impeller has diameter of 60 cm and width of 6 cm at the outlet. The pump runs at 1450 *rpm* and delivers 0.8 m³/s against a head of 80 m. The leakage loss after the impeller is 4 percent of discharge, the external mechanical loss is 10 kW and the hydraulic efficiency is 80 percent. Determine the blade angle at outlet, the power required and the overall efficiency of the pump.

9. Write a note on fluid coupling.