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Roll No.   Total No. of Pages : 02
Total No. of Questions : 09

B.Tech. (ME) (Sem.–6th)
FLUID MACHINERY
Subject Code : ME-306
Paper ID : [A0821]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION 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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Answer briefly :

   (a) Why is curved plate preferred over flat plate in hydraulic turbines ?

   (b) Write Euler equation for energy transfer in turbo machines.

   (c) How would you calculate number of buckets in Pelton turbine ?

   (d) What is the difference between Kaplan and propeller turbine ?

   (e) What is the function of Surge Tank ?

   (f) Define manometric efficiency.

   (g) What is the function of airvessel in a reciprocating pump ?

   (h) Define specific speed of turbine and write its units.

   (i) Why number of blades in Kaplan turbine is less ?

   (j) Which turbine is preferred for overload and part load operation ?

SECTION-B

2. A Francis turbine is designed to have runner dia of 3 m operating at 300 rpm under a head of 45 m with overall η of 82% to generate 6.75 MW. Before starting the manufacturing, testing is to be made on model having scale ratio of $\frac{1}{8}$ under head of nine metre. Find speed, discharge and power of model.

3. Losses in a Pelton turbine may be modelled as b
   Loss due to bucket friction and shock = K_1 (
   bearing friction and windage loss = $K_2 \dfrac{u^2}{2g}$, wh
   bucket velocity, K_1 and K_2 are constants.
   Show that the max. η of Pelton turbine occurs
   when $\dfrac{u}{v} = \dfrac{1 - \cos\theta + K_1}{2(1 - \cos\theta) + K_1 + K_2}$. Where θ is b

4. A Kaplan turbine develops 246476 kW power
   speed ratio of 2, flow ratio 0.6, dia of loss equ
   of runner and η of 90%, find dia and speed of t

5. From the first principles show that the work s
   delivery pipe of a single acting reciprocating pun
   is 84.8%. What is the purpose of fitting an air
   pump ?

6. The diameter of a centrifugal pump at inlet a
   60 cm respectively. Find the minimum starting s
   against a head of 30 m.

SECTION-C

7. A single acting reciprocating pump has a bore
   30 cm. The suction pipe has a dia of 10 cm an
   Find rate of flow into or from airvessel at 0 =
   crank angle at which there is no flow into or f
   runs at 120 rpm and the piston has S.H.M.

8. (a) Define specific speed of a centrifugal pump
   for the same.

   (b) Show that Pelton Turbine is a low specific s

9. Write short notes on (**any two**) :

   (a) Cavitation in Hydraulic machines.

   (b) Differential Accumulator

   (c) Design of Francis turbine.

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