Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

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

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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.**

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SECTION–A

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1. **Write briefly :**

   (a) Define Impulse momentum equation.

   (b) What is the function of undercut on Pelton turbine blades?

   (c) Differentiate between Kaplan and Propeller turbine.

   (d) What is Cavitation, list down cavitation susceptible areas in turbines and pumps?

   (e) Define the term "Manometric Head"?

   (f) What is the function of surge tank?

   (g) What is the function of Air vessel?

   (h) What are 'Unit Quantities'?

   (i) Define Pascal's law.

   (j) How submersible pump is different from a Monoblock pump?

SECTION-B

2. Derive Eular's equation for energy conversion through hydrodynamic rotor.

3. What is the function of Draft tube, derive an expression for efficiency of draft tube.

4. Find the height from the water surface at which a centrifugal pump may be installed in the following case to avoid cavitation :

   Atmospheric pressure = 1.0 bar; vapor pressure = 0.022 bar; inlet and other losses in suction pipe = 1.42 m; effective head of pump = 49 m; and cavitation parameter = 0.115.

5. Define specific speed of a turbine and its importance. Derive an expression for the same.

6. Explain with neat sketch the construction and working of a Differential Accumulator.

SECTION-C

7. What are performance curves? Discuss importance and plotting of these curves in detail for impulse and reaction turbines.

8. (a) Show from the first principles that work saved in a single-acting reciprocation pump, by fitting an air vessel is 84.8 per cent.

   (b) A single acting reciprocating pump has a plunger diameter of 75 mm and stroke length 150 mm. It takes supply of water from a Pump 3 m below the pump through a pipe 5m long and 40 mm diameter. It delivers water to a tank 12 m above the pump through a pipe 30 mm diameter and 15 m long. If the separation takes place at $75 KN/m^2$ below atmospheric pressure, find the maximum speed at which the pump may be operated without separation, plunger operates with S.H.M.

9. In an Inward flow reaction turbine (vertical shaft) the sum of the pressure and kinetic heads at entrance to the spiral casing is 132 m and vertical distance between this section and tail race level is 3.3 m. The peripheral velocity of the runner at entry is 33 m/s, the radial component of velocity of water (velocity of flow) is constant at 11.0 m/s and the discharge from the runner is without whirl and radial. The hydraulic losses are :

   (a) Losses between turbine entrance and discharge from guide vanes   = 4.95m,

   (b) Losses in the runner   = 8.8m,

   (c) Losses in the draft tube   = 0.88m,

   (d) Kinetic energy rejected to tail race   = 0.55m.

   Determine :

   (a) the guide blade angle and runner blade angle at inlet;

   (b) the pressure head at entry to and discharge from runner.