

B.Tech II Year II Semester (R15) Regular Examinations May/June 2017

**FLUID MECHANICS & HYDRAULIC MACHINERY**

(Electronics &amp; Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

**PART - A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- What is hydrostatic paradox?
  - Define stream line and streak line.
  - Mention any two forces that are considered in Euler's equation of motion.
  - If the velocity of flow through a pipe is 2.4 m/s. What will be the loss of head at the entrance of pipe?
  - What is angular momentum principle?
  - What is the role of penstock in a hydroelectric power plant?
  - What are draft tubes? Why do they have a varying cross sectional area?
  - What are multistage centrifugal pumps and when do you go for them?
  - What is power duration curve?
  - Define load factor.

**PART - B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT - I**

- 2 Find the intensity of shear of an oil having viscosity = 1.2 poise. The oil is used for lubricating the clearance between a shaft of diameter 12 cm and its journal bearing. The clearance is 1.6 mm and the shaft rotates at 160 rpm.

**OR**

- 3 If for a two – dimensional potential flow the velocity potential is given by  $\phi = 4x(3y - 4)$ , determine the velocity at the point (3, 4). Find also the value of stream function at the point (3, 4).

**UNIT - II**

- 4 In a laboratory, a 100 mm x 50 mm venturimeter was used which recorded a discharge of 18 lps of water. When the mercury reading was 300 mm? What is the value of venturimeter coefficient?

**OR**

- 5 (a) What is equivalent pipe? Also derive an expression to find the length and diameter of equivalent pipe.  
(b) A pipe 600 m long is conveying water with a velocity of 1.2 m/s. Find the suitable diameter of the pipe if the loss of head due to friction is 3.6 m. Take  $f = 0.01$ .

**UNIT - III**

- 6 A jet of water of diameter 110 mm moving with a velocity of 32 m/s strikes a curved fixed symmetrical plate at the centre. Find the force exerted by the jet of water in the direction of the jet, if the jet is deflected through an angle of  $120^\circ$  at the outlet of the curved plate.

**OR**

- 7 Two inward flow reaction turbines have same runner diameter 0.60 m and the same efficiency. They work under the same head and they have the same velocity of flow 6 m/s. One of the runners A revolves at 520 r.p.m and has an inlet vane angle of  $65^\circ$ . If the outer runner B has an inlet vane angle of  $110^\circ$ , at what speed should it run.

**UNIT - IV**

8 Explain the various characteristic curves of a turbine.

**OR**

9 A centrifugal pump is to discharge water at the rate of 110 lps at a speed of 1450 r.p.m against a head of 23 m. The impeller diameter is 250 mm and its width 50 mm. If the manometric efficiency is 75%, determine the vane angle at the outer periphery.

**UNIT - V**

10 What is a hydel plant? Give the classification.

**OR**

11 (a) How do you assess water power potential of a hydroelectric scheme?

(b) What is surge tank? Discuss its functions & working.

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