BIME-006

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

01294

Term-End Examination

June, 2011

BIME-006 : THERMOFLUID ENGINEERING

Time : 3 hours   *Maximum Marks : 70*

Note :   *Attempt **any five** questions and all questions carry **equal** marks.*

1. (a) Define velocity potential function and steam function.   **7**

   (b) A 25 cm diameter pipe carries oil of specific gravity 0.9 at a velocity of 3 m/s. At another section the diameter is 20 cm. Find the velocity at this section and also mass rate of flow of oil.   **7**

2. (a) Define moment of momentum equation. Where this equation is used ?   **7**

   (b) A 45° reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm² and rate of flow of water is 600 litres/sec.   **7**

3. (a) Define the terms: Viscosity, kinamatic viscosity, velocity gradient, and pressure gradient. 7

   (b) Prove that the maximum velocity in a circular pipe for viscous flow is equal to two times the average velocity of the flow. 7

4. (a) How will you determine the loss of head due to friction in pipes by using Darcy formula ? Also list all the assumptions made in the derivation. 7

   (b) Prove that the head lost due to friction is equal to one third of the total head at inlet for maximum power transmission through pipes or nozzles. 7

5. (a) A fluid of viscosity 0.7 Ns/m^2 and specific gravity 1.3 is flowing through a circular pipe of diameter 100 mm. The maximum shear stress at the pipe wall is given as 196.2 N/m^2. Find. 7

   (i) The pressure gradient

   (ii) The average velocity

   (iii) Reynold's no. of flow

   (b) What is meant by boundary layer ? Why does is increases with distance from up stream edge ? 7

6. (a) What do you mean by gross head, net head   7
         and efficiency of turbine ? Explain the
         different type of the efficiency of a turbine.

    (b) Describe briefly the function of main   7
         components of pelton turbine with neat
         sketches.

7. Write the short notes on *any four*.   4x3½=14

    (a) Cavitation.
    (b) Specific speed of turbine.
    (c) Euler's Equation.
    (d) Normal shock.
    (e) Types of flow.
    (f) Geverning of turbine.
    (g) Adiabatic flow (Fanno-line).

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