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**B.Tech. MECHANICAL ENGINEERING  
(BTMEVI)****Term-End Examination****December, 2013****BIME-006 : THERMOFLUID ENGINEERING***Time : 3 hours**Maximum Marks : 70*

*Note : Attempt any five questions. All questions carry equal marks.*

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1. (a) Define vortex flow. Explain different types of vortex flow. Also give the example. 7
  - (b) The diameter of a pipe at a section 1 and 2 are 10 and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is  $5 \text{ m sec}^{-1}$ . Determine also the velocity at section 2. 7
  2. (a) Explain the local and convective acceleration. The equation given below represents two velocity component. Determine the third component that satisfy the continuity equation. 7  
 $v = 2y^2, w = 2xyz$
  - (b) Explain the mometum equation. Also find the force exerted by the flowing fluid on a pipe. 7
  3. (a) Determine the Darcy - Weisbach equation used for finding loss of head due to friction in pipes. 7
  - (b) Explain the characteristic curve for a hydraulic turbine. 7

4. (a) A turbine is to operate under a head of 25 m at 200 rpm. The discharge is  $9 \text{ m}^3/\text{sec}$ . If the efficiency is 90%, determine the performance of the turbine under a head of 20 meter's. 7
- (b) Derive the Bernoulli's equation. Also write the assumption's made in Bernoulli's equation. 7
5. (a) A 300 mm diameter pipe carries water under a head of 20 meter's with a velocity of 3.5 m/sec. If the axis of pipe turn's through  $45^\circ$ . Find the magnitude and direction of the resultant force at the bend. 7
- (b) What do you understand by turbulent flow? What factor decide the type of flow in a pipe? 7
6. (a) Give the classifications of Turbine. Also explain the governing of a turbine. 7
- (b) Define and explain Newton's law of viscosity. 7
7. Write a short note on (*any three*): 14
- (a) Cavitation
  - (b) Boundary layer theory
  - (c) Lift and Drag Force
  - (d) Specific speed of turbine
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