

**B.Tech. – VIEP – Mechanical Engineering /  
B.Tech. Civil Engineering (BTMEVI/BTCLEVI)**

**Term-End Examination**

**June, 2019**

00531

**BIME-004 : FLUID MECHANICS**

*Time : 3 hours*

*Maximum Marks : 70*

---

*Note : Attempt any five questions. All questions carry equal marks. Use of calculator is permitted.*

---

---

1. (a) How is the U-tube manometer used for the measurement of fluid pressure ? Explain with a neat sketch. 7

(b) A solid cylinder of diameter 5.0 m has a height of 5.0 m. Find the meta-centric height of the cylinder. If the specific gravity of the material of the cylinder is 0.7 and it is floating in water with its axis vertical, state whether the equilibrium is stable or unstable. 7

2. (a) Define path line, streak line and stream line. For which type of flow are these lines identical ? 7
- (b) A 40 cm diameter pipe, conveying water branches into two pipes of diameters 30 cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is 3 m/sec., find the discharge in this pipe. Also determine the velocity in 20 cm diameter pipe if the average velocity in 30 cm diameter pipe is 2 m/sec. 7
3. (a) What is a venturimeter ? Derive an expression for discharge through a venturimeter. 7
- (b) Explain the working of ultrasonic flow meter. 7
4. (a) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take  $C_d = 0.98$ . 7
- (b) What is Momentum Correction Factor ? Briefly explain. 7

5. (a) Explain the working of pitot-tube with a neat sketch. 7
- (b) What is dimensional analysis ? Describe Rayleigh's method for dimensional analysis. 7
6. (a) Explain the working principle of rotodynamic machines with neat sketch. 7
- (b) A pipe of diameter 1.8 m is required to transport an oil of specific gravity 0.8 and viscosity 0.04 poise at the rate of  $4 \text{ m}^3/\text{s}$ . Tests were conducted on a 20 cm diameter pipe using water at  $20^\circ\text{C}$ . Find the velocity and rate of flow in the model. Viscosity of water at  $20^\circ\text{C}$  is 0.01 poise. 7
7. (a) What do you understand by turbulent flow ? What factors decide the types of flow in pipes ? 7
- (b) For turbulent flow in a pipe of 200 mm, find the discharge when the centreline velocity is 30 m/s and velocity at a point 80 mm from the centre as measured by pitot-tube is 2.0 m/s. 7

8. Write short notes on any **four** of the following :  $4 \times 3 \frac{1}{2} = 14$

- (a) Relative Equilibrium
  - (b) Energy Correction Factor
  - (c) Electromagnetic Flow Meter
  - (d) Dimensionless Numbers
  - (e) Fluidization
-