

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(AE) (2011 Onwards) (Sem.-4)**  
**FLUID MECHANICS AND MACHINERY**  
Subject Code : BTAE-403  
M.Code : 54124

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION 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.

**SECTION-A****Q1 Answer briefly :**

- a. Explain the phenomena of capillarity.
- b. What is a continuum? Is air a continuum?
- c. Define the following and give one practical example for each: Laminar flow, Turbulent Flow, Unsteady Flow and Uniform flow.
- d. Describe the use and limitations of flow net.
- e. State the conditions of Equilibrium of a floating body.
- f. State the assumptions of Bernoulli's equation.
- g. What do you mean by ideal and real fluids?
- h. Distinguish between steady and unsteady flow.
- i. Define compressible flow.
- j. Explain metacentric height.

### SECTION-B

2. A solid cylinder of 2-meter diameter and 2-meter height is floating in water with its axis vertical. If the specific gravity of the cylinder is 0.65, find its metacentric height and state whether the equilibrium is stable or unstable.
3. Derive continuity equation for a three dimensional steady or unsteady flows in cartesian coordinate system.
4. In a steady flow, the velocity components are :  $u = 2kx$ ;  $v = ky$  and  $w = -4kz$ . Find the equation of streamline passing through the point (1,0,1).
5. Prove that the stream function  $\psi$  represents the equation for a stream line.
6. What is a flow net? Describe **any one** method of drawing a flow net.

### SECTION-C

7. What do you mean by dimensionless numbers? Derive expression for **any two** dimensionless numbers.
8. Derive an expression for the loss of head due to friction in pipes.
9. With the help of a neat diagram explain the working principle of axial pump. Draw the characteristic curves for axial pump.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**