

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-III Regular / Remedial Examination December 2010****Subject code: 130602****Subject Name: Fluid Mechanics****Date: 16 /12 /2010****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain the terms Dynamic Viscosity and Kinematics Viscosity. Also discuss effect of temperature on viscosity. **07**
(b) Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure. **07**
- Q.2** (a) State the Bernoulli's equation and obtain Bernoulli's equation from Euler's equation of motion. **07**
(b) Derive Darcy Weisbach equation for loss of head in a pipe due to friction. **07**
- OR**
- (b) Calculate the discharge through a rectangular orifice 2 m wide and 1.6 m deep fitted to a water tank. The water level in the tank is 2.7 m above the top edge of the orifice. Take Coefficient of discharge = 0.62 **07**
- Q.3** (a) Define : (1) Specific Weight (2) Buoyancy (3) Meta Centric Height (4) Hydraulic Gradient Line (5) Co-efficient of Contraction (6) Mach Number (7) Capillarity **07**
(b) Explain the conditions of equilibrium of a floating and submerged body. **07**
- OR**
- Q.3** (a) Determine the total pressure and depth of centre of pressure on a triangular plate of base 3 m and altitude 3 m which is immersed in the water in such a way that plan of the plate makes an angle of 60° with the free surface. The base of the plate is parallel to water surface and at a depth of a 2 m from water surface. **07**
(b) Explain analytical Method to determine Metacentric height. **07**
- Q.4** (a) Explain Flow Net in details. Also discuss its characteristics, Utility and Limitations. **07**
(b) The Water is flowing through a pipe having diameters 30 cm and 12 cm at section 1 and 2 respectively. The rate of flow through pipe is 40 litres/second. The section 1 is 8 m above datum and section 2 is 6 m above datum. If the pressure at section 1 is 42 N/cm², find the intensity of pressure at section 2. **07**
- OR**
- Q.4** (a) Derive expression for rate of flow through venturimeter. **07**
(b) The velocity potential function is given by $\phi = 5(x^2 - y^2)$. Calculate the velocity components at the point (4,5). **07**
- Q.5** (a) Prove that velocity of sound wave is equal to square root of the ratio of change of pressure to change of density of a fluid due to disturbance. **07**
(b) Derive an expression for loss of head due to sudden contraction. **07**
- OR**
- Q.5** (a) Derive an equation for discharge over a rectangular notch. **07**
(b) Write short note on flow through pipe in series. **07**
