

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-III Remedial Examination May 2011****Subject code: 130602****Subject Name: Fluid Mechanics****Date: 28-05-2011****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** Derive the continuity equation for three dimensional flow. **14**
- Q.2 (a)** Define and explain: **07**
- 1) Velocity Potential function
 - 2) Stream function
- (b)** Prove that Equipotential lines and lines of constant stream function are orthogonal to each other. **07**
- OR**
- (b)** A pipe 20 cm in diameter and 45m long conveys water at a velocity of 2.5 m/sec. Find the head lost in friction **07**
- 1) Using the Darcy weisbach formula
 - 2) Using Chezy's equation
- Take $f = 0.006$ and $C = 57$
- Q.3 (a)** Define and explain: **07**
- 1) Specific mass
 - 2) Specific weight
 - 3) Specific gravity
- (b)** Prove that Hydrostatic pressure varies linearly with depth of immersion. **07**
- OR**
- Q.3 (a)** Explain how the metacentric height of a floating body can be determined? **07**
- (b)** A cylinder 1.5 meter diameter and 2 meter long floats in sea water with its axis vertical. The base of the cylinder is 1.5 m below the surface of water. Find the total weight of the cylinder and the position of the centre of gravity. If it is 0.3 meter below the metacentre. Sea water weighs 1006 kg /cu.m. **07**
- Q.4 (a)** Explain in detail Total Energy line and Hydraulic gradient line. How will you draw them ? **07**
- (b)** A rectangular block of size 3m long x 1.5m wide x 1m high floats in water such that it's depth of immersion is 0.8m. What is the weight of body? Determine it's metacentric height also. **07**
- OR**
- Q.4 (a)** What are the major losses and minor losses in pipe flow? Discuss them **07**
- (b)** Explain Bernoulli's equation. What are the practical applications of Bernoulli's equation? **07**
- Q.5** What is Venturimeter? Derive an expression for the discharge through a Venturimeter. **14**
- OR**
- Q.5** Describe Various types of fluid flows with example of each. **14**
