

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC SEM-III Examination-Dec-2011

Subject code: X31901

Subject Name: Fluid Mechanics

Date: 13/12/2011

Time: 2.30 pm -5.00 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) Derive continuity equation in 3 dimensional co-ordinate system. **07**
(b) Derive expression for Bernoulli's theorem for stream line flow. **07**
- Q.2** (a) Explain the working principle of U-tube differential manometer with neat sketch. **07**
(b) Explain gauge pressure, vacuum pressure and absolute pressure. **07**
- OR**
- (b) Explain total pressure, metacentre and centre of pressure. **07**
- Q.3** (a) A rectangular plane surface 1 m wide and 2 m high immersed in water, it's plane is making an angle 45° with the free surface of water. The upper edge of rectangular plate is 0.5 m below free surface. Calculate total pressure on plate. **07**
(b) Explain the continuum concept used in fluid mechanics. **07**
- OR**
- Q.3** (a) Explain sonic flow, subsonic flow and supersonic flow. **07**
(b) List the methods used for determining viscosity of a liquid. Explain any one method with a neat sketch. **07**
- Q.4** (a) State and explain hydrostatic law. **07**
(b) Explain forced vortex flow. **07**
- OR**
- Q.4** (a) Explain Reynold's No, Froude No. and Euler's No. **07**
(b) Explain the condition of stability for a submerged body. **07**
- Q.5** (a) Explain stream function and velocity potential function. **07**
(b) Explain characteristics of turbulent flow. **07**
- OR**
- Q.5** (a) An aeroplane is flying at height of 1100 m where the temperature is -45°C . The speed of plane is corresponding to Mach 2. Find the speed of the plane. Take $R=287 \text{ J/KgK}$. **07**
(b) Prove that velocity of sound wave in a compressible fluid is given by $C=\sqrt{\gamma RT}$ **07**
