

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2152003**Date: 05/12/ 2015****Subject Name: Fluid Mechanics & Machines****Time: 10:30am to 1:00pm****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) (1) Explain the following terms: Kinematic Viscosity, Viscosity, Surface tension. **03**
 (2) Define The Capillary Effect & Derive The Equation for Capillary rise & Fall with sketch. **04**
 (b) State & Prove Pascal's Law with usual notations. **07**
- Q.2** (a) Derive the equation for total force (Pressure) & Center of Pressure for a vertical plane surface submerged in liquid. **07**
 (b) Define the Meta center & Meta Centric Height. Explain the method for determination of Meta centric Height. **07**
- OR**
- (b) A Circular Plate of 3M Diameter is Immersed in water in a such a way that it's greatest & least depth bellow the free surface of water are 4M & 1.5M respectively. If this plate is having a concentric circle hole of Diameter of 1.5M, then Calculate the total Pressure & position of center of pressure on one face of the plate. **07**
- Q.3** (a) State the assumptions for Bernoulli's Equation & Derive The Bernoulli's Equation. **07**
 (b) The water is flowing through a pipe having a diameter of 200MM & 100MM at section 1 & section 2 respectively. The discharge through pipe is 35 litres per second. The section 1 is 6M above The Datum line & Section 2 is 4M above Datum Line. If the pressure at section 2 is 39.24 N/cm^2 . Find the intensity of pressure at section 2. **07**
- OR**
- Q.3** (a) Explain clearly: Stream line, Path line & Streak line. **07**
 (b) Derive the continuity equations for 2D & 3D Flow in Cartesian Co-ordinates system with sketch. **07**
- Q.4** (a) Derive an expression for HAGEN-POISEUILLE'S theorem. **07**
 (b) Derive Darcy – Weisbach equation for the loss of head due to friction in pipes. **07**
- OR**
- Q.4** (a) Explain laminar boundary layer & turbulent boundary layer in detail. **07**
 (b) What is Turbine? Derive the equations of work done & efficiency of a pelton wheel. **07**
- Q.5** (a) Define Specific speed of a centrifugal pump & derive the expression for the same. **07**
 (b) Compare the centrifugal pumps with reciprocating pumps. **07**
- OR**
- Q.5** (a) Explain the air vessel in detail & describe the function of the air vassal for reciprocating pumps. **07**
 (b) A pelton wheel is to be designed for a head of 60M when running at a 200RPM. **07**

The pelton wheel Develops 95.6475 KW Shaft power. The velocity of the buckets = 0.45 TIMES the velocity of the jet, overall efficiency = 0.85 & coefficient of the velocity is = 0.98.
