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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.-3)

**FLUID MECHANICS-I**

Subject Code : BTCE-301

M.Code : 56072

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. Describe in brief compressibility and viscosity.
- b. Describe the different sub groups of non-Newtonian fluid, giving example of each.
- c. Explain Pascal's Law.
- d. Differentiate between Free and Forced Vortex motion.
- e. Write Euler's Equation.
- f. What is Metacentric Height?
- g. Derive the equation of stream function.
- h. Derive the equation for actual discharge in an orifice meter.
- i. What do you understand by Kinematic Similarity?
- j. How the discharge in a venturimeter will change if its orientation changes.

**SECTION-B**

- Q2 Explain the three conditions of equilibrium developed when a floating body is given a slight angular displacement.
- Q3 How can you describe the flow patterns and give the individual description of each pattern.
- Q4 Derive the equation of stream function and velocity potential for a uniform stream of velocity  $v$  in a two dimensional field, the velocity  $v$  being inclined to the  $x$ -axis at a positive angle  $\alpha$ .
- Q5 Derive Borda - Carnot equation of head loss.
- Q6 Derive an expression for 'Total Pressure' and 'Position of Centre of Pressure' for an inclined plane surface immersed in liquid

**SECTION-C**

- Q7 A rectangular plate 1 m wide and 1.5 m deep is held vertically in water so that its upper horizontal edge is 1.25 m below the free surface. Find the total water pressure on one face of the plate and depth of centre of pressure.
- Q8 A pitot tube is mounted on an airplane to indicate the relative speed of the plane. What differential pressure intensity will the instrument register when the plane is travelling at a speed of 200 km/hr in a wind blowing at 60 km/hr. against the direction of motion of the plane? Take sp. wt. of air as  $11.9 \text{ N/m}^3$ . Assume  $C_v = 0.98$ .
- Q9 Petrol of sp.gr 0.8 flows upward through a vertical pipe. A & B are two Points in the pipe, B being 0.3 m higher than A. Connections are led from A&B to a U-Tube containing mercury. If differential pressure is  $0.18 \text{ kg/cm}^2$ , find the reading of the manometer.

**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.**