Code No: CE1504 **GEC-R14**

II B. Tech I Semester Regular Examinations, November 2015

FLUID MECHANICS

(Civil Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **Part-B.** All Questions carry equal Marks.

PART-A

6 x 2 = 12M

1. What are the important fluid properties? Write their units.
2. Define and explain stream line, path line and streak line in fluid mechanics.
3. What are the surface and body forces associated with fluid flow? How are they incorporated in Euler's equation?
4. Differentiate between laminar and Turbulent Boundary layers.
5. What do you mean by critical velocity of a fluid flowing through a circular pipe?
6. List and Explain about hydraulic coefficients.

PART-B

6 x 2 = 12M

1. a) Discuss the significance of fluid mechanics and its role in a variety of engineering applications. (5M)

   b) A plate of metal 1m x 1m x 2 mm is to be lifted up with velocity of 0.1 m/s through an infinitely extending gap 20 mm wide containing an oil of sp. gr. 0.9 and viscosity of 2.15 N-S/m^2. Find the force required assuming the plate to remain midway in the gap. Weight of the plate is 29.5 N. (7M)

2. a) What are the different types of fluid flow? Explain. (5M)

   b) The velocity vector in an incompressible flow is given by
   $V = (6xt + yz^2)I + (3t + xy^2)j + (xy - 2xyz - 6tz)K$
   (i) Verify whether the continuity equation is satisfied
   (ii) Determine the acceleration vector at point A (1, 1, 1) at t = 1. 0 (7M)

3. a) State and prove Bernoullis theorem. (8M)

   b) State the Momentum equation and mention some of its engineering applications. (4M)

4. a) What are the different methods of Controlling Boundary layer Separation? Explain. (5M)

b) A plate of length 500 mm and width 200 mm has been placed longitudinally in a stream of crude oil which flows with a velocity of 6 m/sec. if the oil has a specificgravity of 0.9 and kinematic viscosity of 1 stoke. Calculate the boundary layer thickness at the middle of the plate, shear stress at the middle of the plate and friction drag on one side of the plate. (7M)

5. a) Derive the Darcy – Weisbach equation for friction head loss in a pipe. (5M)

   b) Water is flowing through a horizontal pipe line 1500m long and 200 mm in diameter. Pressures at the two ends of the pipe line are 12 kpa and 2 kpa. If f = 0.015, determine the discharge through the pipe in lit/min. Consider only friction loss. (7M)

6. a) Find the expression for discharge over a broad crested weir. (5M)

   b) The head of water over an orifice of diameter 100 mm is 12 m. the water coming out from the orifice is collected in a rectangular tank 2m x 0.9m. The rise of water level in this tank is 1.2m in 30 seconds. Find the coefficient of discharge. (7M)

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