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Code No: CE1504

GEC-R14

II B. Tech I Semester Supplementary Examinations, May 2016

## 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 × 2 = 12M

1. What is pascal's law?
2. What is the difference between laminar flow and turbulent flow?
3. What is momentum correction factor?
4. What is energy thickness?
5. What is dupit's equation?
6. What is the difference between coefficient of contraction and coefficient of velocity?

### PART-B

4 × 12 = 48M

1. a) State the Newton's Law of viscosity and give examples of its application. (6M)  
b) Two large fixed parallel planes are 12mm apart. The space between the surfaces is filled with an oil of viscosity 0.9 N s/m<sup>2</sup>. A flat thin plate 0.2 m<sup>2</sup> area moves through the oil at a velocity of 0.25 m/s. Calculate the drag force when the plate is equidistant from both the planes. (6M)
2. a) Derive Continuity equation for one dimensional steady flow and state the assumptions made. (8M)  
b) Differentiate between rotational and irrotational flows. (4M)
3. a) At a point in the pipe line where the diameter is 20 cm, the velocity of water is 4m/s and the pressure is 343 kN/m<sup>2</sup>. At a point 15 cm downstream, the diameter reduces to 10 cm. calculate the pressure at this point, if the pipe is vertical with flow downward. Neglect the losses. (6M)  
b) Derive Euler's equation of motion along a stream line. (6M)
4. a) The velocity distribution in the turbulent boundary layer over a flat plate is given as  $u/U = ((2y/\delta) - 0.5 (y/\delta)^2)$ . Obtain the expression for the displacement thickness and momentum thickness. (7M)

- b) Explain clearly what you understand by the term boundary layer. Give its importance in the field of engineering. (5M)
5. a) Derive an expression for the loss of head due to friction in a pipe line? (6M)
- b) Three pipes of 400 mm, 200 mm and 300 mm diameters have lengths of 400 m, 200 m and 300 m respectively. They are connected in series to make a compound pipe. The ends of this compound pipe are connected with two tanks where difference of water levels is 16 m. assume the friction factor as 0.005. determine the discharge through the compound pipe neglecting minor losses? (6M)
6. a) An orificemeter with orifice diameter 16 cm is inserted in a pipe of 32 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 60 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orifice meter is 0.70. (6M)
- b) For flow through a venturimeter, obtain the relation for flow rate measurement. Explain its working principle. (6M)

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