Code No: RT21351 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, October/November - 2018
FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS
(Agricultural Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Distinguish between a micro manometer and a differential manometer. (4M)
   b) Define Boundary layer thickness and momentum thickness. (4M)
   c) Differentiate orifice and mouth piece. (4M)
   d) Write down the Darcy's formula for determination head loss due to friction. (2M)
   e) Define kinematic and dynamic similarity. (4M)
   f) Advantages of hydraulic jump. (4M)

PART –B

2. a) A rectangular plate 0.5m wide and 1.6m deep is submerged in water in an inclined position. The maximum and minimum depths of the plate are 1.8m and 0.75m from the free surface. Calculate the hydrostatic force on one face of the plate, and the depth of centre of pressure. (8M)
   b) A liquid occupying a volume of 0.225 m^3, has a weight of 1.89 kN. What are its density, relative density, Specific weight and Specific volume (8M)

3. a) The velocity profile for laminar boundary layer flow is given as $u/U = 2(y/\delta) - (y/\delta)^2$. Find an expression for boundary layer thickness and shear stress. (8M)
   b) Derive Euler's equation of motion with suitable assumptions (8M)

4. Three pipes of 400 mm, 200 mm and 300 mm diameters have lengths of 400 m, 200m 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 whose difference of water levels is 16 m. If co-efficient of friction for these pipes is same and equal to 0.005, determine the discharge through the compound pipe neglecting the minor losses and then including them. (16M)

5. a) Derive from first principles, Chezy's formula for loss of head due to friction in a pipe. (8M)
   b) Three pipes of 800 m, 500 m and 300 m of diameters 50 cm, 30 cm and 40 cm respectively are connected in series. If these pipes are to be replaced by a single pipe of 2000 m long. Find the required diameter. Consider 'f' is same for all pipes and neglect minor losses. (8M)

6. Outline the procedure for Rayleigh's method and Buckingham method used in dimension analysis. (16M)

7. a) What do you understand by a (i) steady and unsteady flow (ii) uniform and non uniform flow in the case of channels. (8M)
   b) What is hydraulic jump? List out different types of hydraulic jump. (8M)
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