Code No: R1621351 **R16** SET - 1

II B. Tech I Semester Regular/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 **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) State Newton's law of viscosity and give its application
 b) Define the terms Laminar and Turbulent boundary layer?
 c) What are the classification of Orifices and Mouthpieces?
 d) Explain the term pipes in parallel and in series
 e) Define hydraulic similitude
 f) What is Bazin's formula and how is it used?

PART -B

2. a) Prove that the center of pressure of a completely submerged plane surface is always below the center of gravity of submerged surface or at most coincide with the gravity when is plane surface is horizontal.
 b) An inverted U-tube manometer is connected to 2 horizontal pipes A and B through which the water is flowing. The vertical distance between the axis of these pipes is 30cm. when an oil of sp.gravity 0.8 is used as a gauge, the vertical heights of water columns in the 2 limbs in the inviter manometer (when measured from the respective center line of pipes) are found to be same and equal to 35cm. Determine the difference of pressure between the pipes.

3. a) Derive Energy thickness. What are the various forms of energy in fluid flow?
 b) Find the displacement thickness, momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$.

4. a) What do you mean by equivalent pipe? Obtain an expression for the equivalent pipe.
 b) A pipe of diameter 300 mm and length of 3500 m is used for the transmission of power by water. The total head intake of the pipe is 500 m. Find the maximum power available at the outlet of the pipe to the value of f=0.006.

5. a) What is Chezy's formula? How is it derived? Show that Chezy's coefficient C=$\left(\frac{R^{1/6}}{n}\right)$ where R is the hydraulic radius and n is Manning's roughness coefficient.
 b) Define the following non-dimensional numbers: Reynold's number, Froude's number, and Mach's number. What are their significances for fluid flow problems?
~~~~~~

Code No: R1621351 **R16** SET - 1

6. a) State and prove the condition under which the trapezoidal section of an urban channel will be most economical.
   b) Calculate the specific energy of $12m^3/s$ of water flowing with a velocity of 1.5m/sin a rectangular channel 7.5m wide. Find the depth of water in the channel when the specific energy would be minimum. What would be the value of critical velocity as well as minimum specific energy?

7. a) Distingue between external mouth piece and internal mouth piece. What is convergent-divergent mouth piece?
   b) Define boundary layer and explain the fundamental causes of its existence. Also discuss the various methods of controlling the boundary layer