Code No: RT21351   (R13)   (SET - 1)

II B. Tech I Semester Supplementary Examinations, May - 2019
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) Give a detailed classification of manometers.

   b) What do you understand by displacement thickness and momentum thickness?

   c) Write the Bernoulli's equation for steady flow and state the necessary conditions that need to be satisfied.

   d) What is meant by an orifice? Give the complete classification of orifices.

   e) List out major and minor losses along with expressions for it.

   f) Explain the terms specific energy of a flowing liquid, minimum specific energy.

PART –B

2 a) Discuss the different types of manometers used in pressure measurement.

   b) A velocity profile of a flowing fluid over a flat plate is parabolic and given by $u = ay^2 + by + c$ Where a, b and c are constants. The velocity of fluid is 1.2 m/s at 20 cm from the plate, which the vertex point of the velocity distribution. Find out the velocity gradients and shear stresses at $y = 0.10$ and 20 cm respectively. Take $\mu = 8$ poise for the flowing fluid.

3 a) What are the factors affecting the boundary layer thickness?

   b) In a power plant located near the sea a chimney of 1.2 m diameter and 35 m height has been installed. During a cyclone the wind reaches velocity in the range of 60 kmph. Determine the moment at the base of the chimney.

4 a) Explain with neat sketches, different types of mouthpieces.

   b) A rectangular notch of crest width 40 cm is used to measure the discharge in a rectangular channel of 60 cm wide and 45cm deep. If head over the crest is 20 cm find the discharge. Take Cd=0.62

5   The rate of flow of water through a horizontal pipe is 0.25 m^3 /sec. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. the pressure intensity in the smaller pipe is 11.772 N/cm^2 . Determine: i) loss of head due to sudden enlargement, ii) pressure intensity in the large pipe, iii) power lost due to enlargement

6 a) Derive the expressions for Reynolds Number, Mach Number and Froude Number

   b) State and explain Chezy's formula for uniform flow in open channels. What is momentum energy correction factor?

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7 a) Define specific speed of a centrifugal pump? Derive the formula.

   b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm. Works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are setback at an angle of 40° at outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm. Find i) Vane angle at inlet ii) Work done by impeller on water/second and iii) Manometric efficiency.