Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCCH 4201

Third Semester (Back/Special) Examination – 2013

FLUID FLOW AND FLOW MEASUREMENT

BRANCH : CHEM

QUESTION CODE : D 216

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) Differentiate between fluid statics and fluid dynamics.

   (b) Write the Barometric equation.

   (c) Define potential flow.

   (d) Discuss the effect of temperature on the viscosities of fluids and gases.

   (e) Define transition length and write its equation.

   (f) Define Fanning friction factor and Darcy friction factor.

   (g) With a diagram explain roughness parameter.

   (h) What are wall drag and form drag ?

   (i) Write and explain Stoke's law.

   (j) Write the uses of venturimeter and pitot tube.

2. With a neat sketch, for a fluid, prove that the pressure at any point is independent of direction. 10

P.T.O.

3. Water flows through a pipe AB 1.2 m in diameter at 3 m/s and then passes through a pipe BC 1.5 m in diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries 1/3 of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find : (i) the volume rate of flow in AB, (ii) the velocity in BC, (iii) the velocity in CD, and (iv) the diameter of CE. 10

4. With a neat diagram, derive the Bernoulli equation without friction. 10

5. The inlet and throat diameters of a horizontal venturimeter are 30 and 10 cm respectively. The liquid flowing through the meter is water. The pressure intensity at inlet is 14 N/cm^2 while the vacuum pressure head at the throat is 38 cm of mercury. Find the rate of flow. Assume that 4 % of the differential head is lost between the inlet and throat. Find also the value of Cd for the venturimeter. 10

6. Discuss in details the conditions for, types of, and applications of fluidization. 3+4+3

7. With a neat sketch discuss the construction and working of : 5×2

   (a) Reciprocating pump

   (b) Centrifugal pump.

8. Write short notes on any two of the followings : 5×2

   (a) Drag coefficient

   (b) Terminal settling velocity

   (c) Orifice meter

   (d) Cavitation and priming.