Registration No.										

Total number of pages: 01 **B.Tech.**
PCCH4201

3rd Semester Back Examination 2017-18
FLUID FLOW & FLOW MEASUREMENT
BRANCH : CHEM
Time : 3 Hours
Max Marks : 70
Q.Code : B1178

Answer Question No. 1 which is compulsory and any FIVE from the rest.
The figures in the right-hand margin indicate marks.
Assume suitable notations and any missing data wherever necessary.
Answer all parts of a question at a place.

1. **Answer the following questions :** **(2 x 10)**

(a) What are dynamic and kinematic viscosities ?
(b) Define non-Newtonian fluids with examples.
(c) Write and explain the Newton's law of viscosity.
(d) Discuss the viscosity behaviour of gases and liquids with the change in temperature.
(e) What is a hydraulically smooth pipe ?
(f) Mention the relationship between friction factor and Reynold's number for laminar flow.
(g) Write the Reynolds equation and mention its significance.
(h) Differentiate between skin friction and form friction.
(i) What is creeping flow ?
(j) Differentiate between single acting and double acting reciprocating pumps.

2. With a neat diagram, prove that the pressure at any point is independent of direction. **(10)**

3. Discuss the construction of aventuri meter with a neat diagram. **(10)**

4. A fluid is flowing through a 6 cm diameter pipe at a velocity of 2.5 m/s. Suddenly it enters into the larger cross-sectional part of the pipe having a diameter of 12 cm. Calculate the frictional loss due to sudden expansion of flow area. **(10)**

5. Crude oil of density 850 kg/m^3 is pumped at a rate of 5 l/s through 500 m of steel pipe under a pressure drop of 560 kPa. Calculate the Fanning friction factor if the pipe diameter is 50 mm, using Hagen-Poiseulli equation. **(10)**

6. Explain the characteristic curves of centrifugal pump. **(10)**

7. Prove that the average velocity is one-half the maximum velocity for laminar flow of Newtonian fluids in pipes. **(10)**

8. **Write short notes on any TWO :** **(5 x 2)**

(a) Boundary layer separation and wake formation
(b) Orifice meter
(c) Net positive suction head
(d) Pitot tube