Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

III SEMESTER B.TECH (CHEMICAL ENGINEERING)

END SEMESTER EXAMINATIONS, JANUARY 2016

SUBJECT: MOMENTUM TRANSFER [CHE 203]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 100

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	What is hydrostatic equilibrium? Deduce the equation for hydrostatic equilibrium.	**06**
1B.	A micro manometer (well type) with two manometric fluids water of sp.gr.1.0 and CCl_4 of sp.gr.1.59 is used to measure the pressure difference of air flow in a pipe line. The manometer indicates 2 cm difference of water. Estimate the pressure difference. Derive the equation used here with all assumptions.	**10**
1C.	Define: i) Steady flow ii) Equivalent length	**04**
2A.	Explain the correction factors to be incorporated in Bernoulli's equation.	**05**
2B.	A flow of 7 liters per second of oil having specific gravity 0.91 and viscosity 0.124Ns/m^2 is pumped through a pipe line 75mm diameter having a length of 62m and whose outlet is 3m higher than its inlet. Calculate the power required for the pump if its efficiency is 60%. Use appropriate equation to calculate friction factor.	**10**
2C.	Explain the importance of dimensional analysis.	**05**
3A.	Explain the concept of Prandtl's mixing length	**05**
3B.	Oil of specific gravity 0.88 and viscosity 50CP flows in a pipe of 7.5 cm diameter. The flow is measured by a pitot tube located centrally. U tube inclined manometer containing water as measuring fluid shows the reading of 40 cm. Angle of inclination of an inclined limb to the horizontal is 15^o. Find the discharge.	**08**
3C.	Explain the industrial applications of packed and fluidized beds.	**07**
4A.	Explain the terms Drag and drag coefficient.	**05**

4B.	The central line velocity is measured a 3 m/s in a 0.1 m diameter pipe. If the fluid flowing has a density of 1260kg/m^3 and viscosity of 0.9NS/m^2, determine whether the flow is laminar or turbulent. Calculate i) the pressure gradient ii) boundary shear iii) rate of flow in l.p.s. iv) the velocity at a distance of 0.04 meters from the wall. Derive the equations used here.	**15**
5A.	Explain the concept of boundary layer for fluid flow through a circular pipe.	**08**
5B.	A venturimeter having inlet diameter of 75mm and a throat diameter of 25 mm is used for measuring the rate of flow of air through a pipe. Mercury gauges resister pressure at inlet and the throat equivalent to 250mm and 150mm respectively. Determine the volume of air flowing through the pipe per unit time. Assume adiabatic condition. The density of air at the inlet is 1.6kg/m^3 and the barometric pressure is 760 mm Hg. Derive the equation used here.	**12**
6.	Explain any FOUR of the following; i) Darcy's equation ii) Pump Characteristics iii) Pipe fittings iv) V notch v) Newtonian and Non Newtonian fluids	**4X5=20**