School of Engineering and Applied Science (SEAS), Ahmedabad University

Name: _____ Roll no.: _____

B. Tech. (Chemical): Semester V
Transport Phenomena: Mid Term Exam (Monsoon Sem.:2019);
Marks: 50 M, Wt.: 30 %
September 25, 2019, Wednesday, 3.30 PM – 5.00 PM

Instructions:

1 All questions are compulsory
2 Figures to right indicate full marks.
4 All acronyms carry their usual meaning.
5 Assume suitable data wherever necessary and specify it clearly in your answers.

Answer the Questions

Q-1: Consider steady state laminar flow of a fluid of constant density ρ, viscosity μ in a vertical tube of length L and radius R. Liquid flows downward under influence of pressure difference and gravity. Tube length is very large with respect to tube radius. End effects are unimportant towards most of the tube. Derive an expression for velocity distribution in the tube using shell balance. Draw a schematic that is properly labelled. Also find the expressions for maximum velocity and average velocity

(10 M)

Q-2: Derive an expression for pressure drop across a packed bed having void fraction ε, effective particle diameter D_p. Derive expressions for laminar, turbulent and transition flow (20 M)

Q-3: Derive an expression for boundary layer thickness for laminar flow on a flat plate with zero pressure gradient. Also derive expressions for wall shear stress. Assume no effect of gravity.

(20 M)

All the best
