Code No: R05210801 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
FLUID MECHANICS FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive the continuity equation for a compressible fluid.
   (b) Derive the energy equation for a compressible fluid. [8+8]
2. Write short notes on:
   (a) Gravity decanter
   (b) Manometer
   (c) Centrifugal decanter. [6+4+6]
3. (a) Define 'Equivalent diameter' for fluid flow through ducts of noncircular diameter.
   (b) Calculate the hydraulic mean diameter of the annular space between a 4 cm and 6 cm tubes.
   (c) Draw velocity profile for laminar flow in a circular pipe. [5+5+6]
4. (a) Explain the construction of an orifice meter with a neat sketch.
   (b) Discuss the pressure recovery in an orifice meter and venturi meter. [8+8]
5. Describe the following with the help of neat sketches.
   (a) swing check valve
   (b) simple stuffing box
   (c) liquid flow through a centrifugal pump
   (d) efficiency curve for an ideal and actual centrifugal pump. [4+4+4+4]
6. Define the following:
   (a) Steady and Unsteady flow
   (b) Uniform and Non-Uniform flow
   (c) Laminar and Turbulent flow
   (d) Stream lines and stream tube. [4+4+4+4]
7. (a) What is the superficial velocity and how is it related to the average velocity in the packed bed Describe the term shape factor.
   (b) A particle of specific gravity 2.6 is falling by gravity in water (μ= 1cp) at a Reynold's number of 200.What is the size of the particle in microns and its terminal velocity (ρ_{H_2o}= 990Kg/m^3)(C_D= 0.95). [8+8]

8. (a) A bed of ion-exchange beads of 3.28 m depth is to be washed with water to remove dirt . The average size of particle is 1.1 mm and have a density of $1.24x10^3$ Kg/m^3. What is the minimum fluidization velocity using water at 30^0C? What is the corresponding Reynolds Number of the particles? The beads are assumed to be spherical (ϕ_s= 1) and $\in_m$ is taken as 0.40.

   (b) Explain the terms:

   i. Void fraction
   ii. Shape factor
   iii. Superficial velocity
   iv. Interstitial velocity. [8+8]

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Code No: R05210801 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
FLUID MECHANICS FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the construction of an orifice meter with a neat sketch.
   (b) Discuss the pressure recovery in an orifice meter and venturi meter. [8+8]
2. Define the following:
   (a) Steady and Unsteady flow
   (b) Uniform and Non-Uniform flow
   (c) Laminar and Turbulent flow
   (d) Stream lines and stream tube. [4+4+4+4]
3. Write short notes on:
   (a) Gravity decanter
   (b) Manometer
   (c) Centrifugal decanter. [6+4+6]
4. (a) Derive the continuity equation for a compressible fluid.
   (b) Derive the energy equation for a compressible fluid. [8+8]
5. (a) Define 'Equivalent diameter' for fluid flow through ducts of noncircular diameter.
   (b) Calculate the hydraulic mean diameter of the annular space between a 4 cm and 6 cm tubes.
   (c) Draw velocity profile for laminar flow in a circular pipe. [5+5+6]
6. (a) A bed of ion-exchange beads of 3.28 m depth is to be washed with water to remove dirt . The average size of particle is 1.1 mm and have a density of 1.24×10^3 Kg/m^3. What is the minimum fluidization velocity using water at 30^0C? What is the corresponding Reynolds Number of the particles? The beads are assumed to be spherical ($\phi_s = 1$) and $\in_m$ is taken as 0.40.
   (b) Explain the terms:
      i. Void fraction
      ii. Shape factor
      iii. Superficial velocity
      iv. Interstitial velocity. [8+8]

7. Describe the following with the help of neat sketches.
   (a) swing check valve
   (b) simple stuffing box
   (c) liquid flow through a centrifugal pump
   (d) efficiency curve for an ideal and actual centrifugal pump. [4+4+4+4]

8. (a) What is the superficial velocity and how is it related to the average velocity in the packed bed Describe the term shape factor.
   (b) A particle of specific gravity 2.6 is falling by gravity in water (μ= 1cp) at a Reynold's number of 200.What is the size of the particle in microns and its terminal velocity (ρ_{H_2o}= 990Kg/m^3)(C_D= 0.95). [8+8]

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Code No: R05210801 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
FLUID MECHANICS FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Define the following:
   (a) Steady and Unsteady flow
   (b) Uniform and Non-Uniform flow
   (c) Laminar and Turbulent flow
   (d) Stream lines and stream tube. [4+4+4+4]

2. (a) A bed of ion-exchange beads of 3.28 m depth is to be washed with water to remove dirt . The average size of particle is 1.1 mm and have a density of $1.24x10^3$ Kg/m^3. What is the minimum fluidization velocity using water at 30^0C? What is the corresponding Reynolds Number of the particles? The beads are assumed to be spherical (ϕ_s= 1) and $\in_m$ is taken as 0.40.
   (b) Explain the terms:
      i. Void fraction
      ii. Shape factor
      iii. Superficial velocity
      iv. Interstitial velocity. [8+8]

3. (a) Derive the continuity equation for a compressible fluid.
   (b) Derive the energy equation for a compressible fluid. [8+8]

4. (a) Define 'Equivalent diameter' for fluid flow through ducts of noncircular diameter.
   (b) Calculate the hydraulic mean diameter of the annular space between a 4 cm and 6 cm tubes.
   (c) Draw velocity profile for laminar flow in a circular pipe. [5+5+6]

5. Describe the following with the help of neat sketches.
   (a) swing check valve
   (b) simple stuffing box
   (c) liquid flow through a centrifugal pump
   (d) efficiency curve for an ideal and actual centrifugal pump. [4+4+4+4]

6. (a) Explain the construction of an orifice meter with a neat sketch.

(b) Discuss the pressure recovery in an orifice meter and venturi meter. [8+8]

7. (a) What is the superficial velocity and how is it related to the average velocity in the packed bed Describe the term shape factor.

   (b) A particle of specific gravity 2.6 is falling by gravity in water (μ= 1cp) at a Reynold's number of 200.What is the size of the particle in microns and its terminal velocity (ρ_{H_2o}= 990Kg/m^3)(C_D= 0.95). [8+8]

8. Write short notes on:

   (a) Gravity decanter

   (b) Manometer

   (c) Centrifugal decanter. [6+4+6]

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Code No: R05210801 **R05** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
FLUID MECHANICS FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is the superficial velocity and how is it related to the average velocity in the packed bed Describe the term shape factor.
   (b) A particle of specific gravity 2.6 is falling by gravity in water (μ= 1cp) at a Reynold's number of 200.What is the size of the particle in microns and its terminal velocity (ρ_{H_2o}= 990Kg/m^3)(C_D= 0.95). [8+8]

2. (a) A bed of ion-exchange beads of 3.28 m depth is to be washed with water to remove dirt . The average size of particle is 1.1 mm and have a density of 1.24x10^3 Kg/m^3. What is the minimum fluidization velocity using water at 30^{0}C? What is the corresponding Reynolds Number of the particles? The beads are assumed to be spherical (ϕ_s= 1) and $\in_m$ is taken as 0.40.
   (b) Explain the terms:
      i. Void fraction
      ii. Shape factor
      iii. Superficial velocity
      iv. Interstitial velocity. [8+8]

3. Describe the following with the help of neat sketches.
   (a) swing check valve
   (b) simple stuffing box
   (c) liquid flow through a centrifugal pump
   (d) efficiency curve for an ideal and actual centrifugal pump. [4+4+4+4]

4. Define the following:
   (a) Steady and Unsteady flow
   (b) Uniform and Non-Uniform flow
   (c) Laminar and Turbulent flow
   (d) Stream lines and stream tube. [4+4+4+4]

5. (a) Explain the construction of an orifice meter with a neat sketch.
   (b) Discuss the pressure recovery in an orifice meter and venturi meter. [8+8]

6. (a) Derive the continuity equation for a compressible fluid.
   (b) Derive the energy equation for a compressible fluid. [8+8]

7. Write short notes on:
   (a) Gravity decanter
   (b) Manometer
   (c) Centrifugal decanter. [6+4+6]

8. (a) Define 'Equivalent diameter' for fluid flow through ducts of noncircular diameter.
   (b) Calculate the hydraulic mean diameter of the annular space between a 4 cm and 6 cm tubes.
   (c) Draw velocity profile for laminar flow in a circular pipe. [5+5+6]

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