Code No: RR210801 **RR** **Set No. 2**

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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Water flows through an orifice of 25mm diameter situated in a 75mm pipe at the rate of 300 cm^2/sec. What will be the difference in the level on a water manometer connected across the meter. Viscosity of the water is given as $1mNs/m^2$. [16]

2. A cylinder containing 2 kg nitrogen at 0.14 Mpa abs and 5^0c is compressed isentropically to 0.3 Mpa abs. Find the final temperature and the work required. Take $\gamma = 1.4$. [16]

3. To clean a sand bed filter, it is fluidized at minimum conditions using water at 24^0C the round sand particles have density of 2550 kg/m^3 and an average size of 0.4mm. The sand has the following properties: Sphericity= 0.86; void fraction = 0.42. The diameter is 0.4 m and desired height of the bed at these minimum fluidizing conditions is 1.75m, calculate the amount of solids need. [16]

4. Derive the condition for hydrostatic equilibrium in a centrifugal field. [16]

5. Prove that the maximum velocity of an incompressible fluid flowing through the pipe I given by $(\tau_w g_c r_w/2\mu)$. [16]

6. (a) What are the different forces acting on the particle moving through the fluid.
   (b) Define terminal velocity. Derive the equation for terminal velocity for gravitational settling. [6+10]

7. An oil of specific gravity 0.85 and 1.7 cp viscosity is flowing through a smooth pipe of 150 mm diameter at the rate of 20 lt/min. Determine whether the flow is laminar or turbulent. Calculate pressure drop for 100 m length of the pipe. [16]

8. (a) Describe the process of Boundary layer formation, also describe the process of Boundary layer separation. [10]
   (b) Define the terms fully developed flow and transition length. [6]

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Code No: RR210801 **RR** **Set No. 4**

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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A cylinder containing 2 kg nitrogen at 0.14 Mpa abs and 5^0c is compressed isentropically to 0.3 Mpa abs. Find the final temperature and the work required. Take $\gamma = 1.4$. [16]

2. An oil of specific gravity 0.85 and 1.7 cp viscosity is flowing through a smooth pipe of 150 mm diameter at the rate of 20 lt/min. Determine whether the flow is laminar or turbulent. Calculate pressure drop for 100 m length of the pipe. [16]

3. (a) What are the different forces acting on the particle moving through the fluid.
   (b) Define terminal velocity. Derive the equation for terminal velocity for gravitational settling. [6+10]

4. To clean a sand bed filter, it is fluidized at minimum conditions using water at 24^0C the round sand particles have density of 2550 kg/m^3 and an average size of 0.4mm. The sand has the following properties: Sphericity= 0.86; void fraction = 0.42. The diameter is 0.4 m and desired height of the bed at these minimum fluidizing conditions is 1.75m, calculate the amount of solids need. [16]

5. Water flows through an orifice of 25mm diameter situated in a 75mm pipe at the rate of 300 cm^2/sec. What will be the difference in the level on a water manometer connected across the meter. Viscosity of the water is given as $1mNs/m^2$. [16]

6. (a) Describe the process of Boundary layer formation, also describe the process of Boundary layer separation. [10]
   (b) Define the terms fully developed flow and transition length. [6]

7. Derive the condition for hydrostatic equilibrium in a centrifugal field. [16]

8. Prove that the maximum velocity of an incompressible fluid flowing through the pipe I given by $(\tau_w g_c r_w/2\mu)$. [16]

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Code No: RR210801 **RR** **Set No. 1**

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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are the different forces acting on the particle moving through the fluid.
   (b) Define terminal velocity. Derive the equation for terminal velocity for gravitational settling. [6+10]
2. An oil of specific gravity 0.85 and 1.7 cp viscosity is flowing through a smooth pipe of 150 mm diameter at the rate of 20 lt/min. Determine whether the flow is laminar or turbulent. Calculate pressure drop for 100 m length of the pipe. [16]
3. (a) Describe the process of Boundary layer formation, also describe the process of Boundary layer separation. [10]
   (b) Define the terms fully developed flow and transition length. [6]
4. Prove that the maximum velocity of an incompressible fluid flowing through the pipe I given by $(\tau_w g_c r_w/2\mu)$. [16]
5. A cylinder containing 2 kg nitrogen at 0.14 Mpa abs and 5^0c is compressed isentropically to 0.3 Mpa abs. Find the final temperature and the work required. Take $\gamma = 1.4$. [16]
6. Water flows through an orifice of 25mm diameter situated in a 75mm pipe at the rate of 300 cm^2/sec. What will be the difference in the level on a water manometer connected across the meter. Viscosity of the water is given as $1mNs/m^2$. [16]
7. To clean a sand bed filter, it is fluidized at minimum conditions using water at 24^0C the round sand particles have density of 2550 kg/m^3 and an average size of 0.4mm. The sand has the following properties: Sphericity= 0.86; void fraction = 0.42. The diameter is 0.4 m and desired height of the bed at these minimum fluidizing conditions is 1.75m, calculate the amount of solids need. [16]
8. Derive the condition for hydrostatic equilibrium in a centrifugal field. [16]

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Code No: RR210801 **RR** **Set No. 3**

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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Water flows through an orifice of 25mm diameter situated in a 75mm pipe at the rate of 300 cm^2/sec. What will be the difference in the level on a water manometer connected across the meter. Viscosity of the water is given as $1mNs/m^2$. [16]

2. Derive the condition for hydrostatic equilibrium in a centrifugal field. [16]

3. An oil of specific gravity 0.85 and 1.7 cp viscosity is flowing through a smooth pipe of 150 mm diameter at the rate of 20 lt/min. Determine whether the flow is laminar or turbulent. Calculate pressure drop for 100 m length of the pipe. [16]

4. To clean a sand bed filter, it is fluidized at minimum conditions using water at 24^0C the round sand particles have density of 2550 kg/m^3 and an average size of 0.4mm. The sand has the following properties: Sphericity= 0.86; void fraction = 0.42. The diameter is 0.4 m and desired height of the bed at these minimum fluidizing conditions is 1.75m, calculate the amount of solids need. [16]

5. (a) Describe the process of Boundary layer formation, also describe the process of Boundary layer separation. [10]
   (b) Define the terms fully developed flow and transition length. [6]

6. Prove that the maximum velocity of an incompressible fluid flowing through the pipe I given by $(\tau_w g_c r_w/2\mu)$. [16]

7. (a) What are the different forces acting on the particle moving through the fluid.
   (b) Define terminal velocity. Derive the equation for terminal velocity for gravitational settling. [6+10]

8. A cylinder containing 2 kg nitrogen at 0.14 Mpa abs and 5^0c is compressed isentropically to 0.3 Mpa abs. Find the final temperature and the work required. Take $\gamma = 1.4$. [16]

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