Code.No: **RR410801** | RR | SET-1

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
TRANSPORT PHENOMENA
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks

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1. State the similarities and differences among the three transfer operations. Express in a tabular form. [16]

2. Derive the Hagon Poiseulle equation for a fluid flowing through a pipe of length L and radius R. [16]

3. Using shell mass balance technique derive an equation for mass transfer when a liquid is evaporating into stagnant gas film at steady state. [16]

4. Air at 27^0c flows normal to a 73^0c, 30mm O.D water pipe. The air moves at 1m/s. Estimate the rate of heat transfer per unit length of the pipe. Kinematic Viscosity = $1.624*10^{-6}m^2/s$. Thermal conductivity = $0.0261w/m^0k$, N_{pr} = 0.702. [16]

5. Chlorine is being absorbed from a gas in a small experimental wetted wall tower. The absorbing fluid is water, which is moving with an average velocity of 17.7 cm/sec. What is the absorption rate in gm moles/hr if $D_{cl_2-H_2O}$ = $1.26*10^{-5}$ cm^2/s. in the liquid phase and if the saturation concentration of chlorine in water is 0.823g cl_2 per 100 g of water. Ignore chemical reaction between cl_2 and H_20. The tower height is 13 cm and radius is 1.4cm. [16]

6. Derive equation of continuity for a fluid flowing through a volume element and reduce it for incompressible fluid. [16]

7. Determine the velocity and shear stress distribution for the tangential laminar flow of an incompressible fluid contained between two vertical co-axial cylinders, outer cylinder being rotating with an angular velocity. Neglect end effects. [16]

8. Derive time smoothed equation of motion. [16]

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Code.No: **RR410801** | RR | SET-2

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
TRANSPORT PHENOMENA
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks
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1. Using shell mass balance technique derive an equation for mass transfer when a liquid is evaporating into stagnant gas film at steady state. [16]

2. Air at 27^0c flows normal to a 73^0c, 30mm O.D water pipe. The air moves at 1m/s. Estimate the rate of heat transfer per unit length of the pipe. Kinematic Viscosity = $1.624*10^{-6}m^2/s$. Thermal conductivity = $0.0261w/m^0k$, $N_{pr} = 0.702$. [16]

3. Chlorine is being absorbed from a gas in a small experimental wetted wall tower. The absorbing fluid is water, which is moving with an average velocity of 17.7 cm/sec. What is the absorption rate in gm moles/hr if $D_{cl_2-H_2O} = 1.26*10^{-5}$ cm^2/s. in the liquid phase and if the saturation concentration of chlorine in water is 0.823g cl_2 per 100 g of water. Ignore chemical reaction between cl_2 and H_20. The tower height is 13 cm and radius is 1.4cm. [16]

4. Derive equation of continuity for a fluid flowing through a volume element and reduce it for incompressible fluid. [16]

5. Determine the velocity and shear stress distribution for the tangential laminar flow of an incompressible fluid contained between two vertical co-axial cylinders, outer cylinder being rotating with an angular velocity. Neglect end effects. [16]

6. Derive time smoothed equation of motion. [16]

7. State the similarities and differences among the three transfer operations. Express in a tabular form. [16]

8. Derive the Hagon Poiseulle equation for a fluid flowing through a pipe of length L and radius R. [16]

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Code.No: **RR410801** | RR | SET-3

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
TRANSPORT PHENOMENA
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks
- - -

1. Chlorine is being absorbed from a gas in a small experimental wetted wall tower. The absorbing fluid is water, which is moving with an average velocity of 17.7 cm/sec. What is the absorption rate in gm moles/hr if $D_{cl_2-H_2O}$ = 1.26*10^{-5} cm^2/s. in the liquid phase and if the saturation concentration of chlorine in water is 0.823g cl_2 per 100 g of water. Ignore chemical reaction between cl_2 and H_20. The tower height is 13 cm and radius is 1.4cm. [16]

2. Derive equation of continuity for a fluid flowing through a volume element and reduce it for incompressible fluid. [16]

3. Determine the velocity and shear stress distribution for the tangential laminar flow of an incompressible fluid contained between two vertical co-axial cylinders, outer cylinder being rotating with an angular velocity. Neglect end effects. [16]

4. Derive time smoothed equation of motion. [16]

5. State the similarities and differences among the three transfer operations. Express in a tabular form. [16]

6. Derive the Hagon Poiseulle equation for a fluid flowing through a pipe of length L and radius R. [16]

7. Using shell mass balance technique derive an equation for mass transfer when a liquid is evaporating into stagnant gas film at steady state. [16]

8. Air at 27^0c flows normal to a 73^0c, 30mm O.D water pipe. The air moves at 1m/s. Estimate the rate of heat transfer per unit length of the pipe. Kinematic Viscosity = 1.624*$10^{-6}m^2/s$. Thermal conductivity = 0.0261w/m^0k, N_{pr} = 0.702. [16]

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Code.No: **RR410801** | RR | SET-4

IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
TRANSPORT PHENOMENA
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks

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1. Determine the velocity and shear stress distribution for the tangential laminar flow of an incompressible fluid contained between two vertical co-axial cylinders, outer cylinder being rotating with an angular velocity. Neglect end effects. [16]

2. Derive time smoothed equation of motion. [16]

3. State the similarities and differences among the three transfer operations. Express in a tabular form. [16]

4. Derive the Hagon Poiseulle equation for a fluid flowing through a pipe of length L and radius R. [16]

5. Using shell mass balance technique derive an equation for mass transfer when a liquid is evaporating into stagnant gas film at steady state. [16]

6. Air at 27^0c flows normal to a 73^0c, 30mm O.D water pipe. The air moves at 1m/s. Estimate the rate of heat transfer per unit length of the pipe. Kinematic Viscosity = $1.624*10^{-6}m^2/s$. Thermal conductivity = $0.0261w/m^0k$, $N_{pr} = 0.702$. [16]

7. Chlorine is being absorbed from a gas in a small experimental wetted wall tower. The absorbing fluid is water, which is moving with an average velocity of 17.7 cm/sec. What is the absorption rate in gm moles/hr if $D_{cl_2-H_2O} = 1.26*10^{-5}$ cm^2/s. in the liquid phase and if the saturation concentration of chlorine in water is 0.823g cl_2 per 100 g of water. Ignore chemical reaction between cl_2 and H_20. The tower height is 13 cm and radius is 1.4cm. [16]

8. Derive equation of continuity for a fluid flowing through a volume element and reduce it for incompressible fluid. [16]

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