Code.No: **RR310803** | RR | SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
HEAT TRANSFER
(CHEMICAL ENGINEERING)

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

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

1. Derive an equation for steady – state heat transfer through a spherical shell of inner radius r_1 and outer radius r_2. [16]

2. Discuss the following
   i) Penetration distance.
   ii) Logarithmic mean temperature difference (LMTD)
   iii) Fouling factors. [5+6+5]

3.a) Differentiate between hydrodynamic and thermal boundary layers on a flat plate
   b) Write the significance of the following
   i) Fourier Number
   ii) Graetz number
   iii) Peclet number
   iv) Biot number [8+8]

4. A vertical Plate at 102^0C is 0.75 m wide and 15 cm high. It rests in still air at 1 atm 25^0C. Determine the local heat transfer coefficient at 8 cm from the leading edge of the plate. The properties of the air at film temperature may be taken as:
   Thermal Conductivity = 0.03w/mk
   Viscosity = 2.03×10^{-5} Pas
   Density = 1.00 kg/ m^3
   Specific heat = 1.01 kJ/kg.k [16]

5. Discuss the following:
   a) Pool boiling and nucleate boiling
   b) Film boiling [8+8]

6.a) Explain black body radiation.
   b) State and prove Kirchoff's law of radiation. [8+8]

7.a) Derive the equation for combined heat transfer by conduction- convection and radiation.
   b) Write a brief note on "Radiation in film boiling" [10+6]

8.a) Define capacity and economy of an evaporator.
   b) Describe the methods of feeding in multiple effect evaporators. [6+10]

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Code.No: **RR310803** | RR | SET-2

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
HEAT TRANSFER
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks

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1.a) Differentiate between hydrodynamic and thermal boundary layers on a flat plate
b) Write the significance of the following
i) Fourier Number
ii) Graetz number
iii) Peclet number
iv) Biot number [8+8]

2. A vertical Plate at 102^0C is 0.75 m wide and 15 cm high. It rests in still air at 1 atm 25^0C. Determine the local heat transfer coefficient at 8 cm from the leading edge of the plate. The properties of the air at film temperature may be taken as:
Thermal Conductivity = 0.03w/mk
Viscosity = 2.03×10^{-5} Pas
Density = 1.00 kg/m^3
Specific heat = 1.01 kJ/kg.k [16]

3. Discuss the following:
a) Pool boiling and nucleate boiling
b) Film boiling [8+8]

4.a) Explain black body radiation.
b) State and prove Kirchoff's law of radiation. [8+8]

5.a) Derive the equation for combined heat transfer by conduction- convection and radiation.
b) Write a brief note on "Radiation in film boiling" [10+6]

6.a) Define capacity and economy of an evaporator.
b) Describe the methods of feeding in multiple effect evaporators. [6+10]

7. Derive an equation for steady – state heat transfer through a spherical shell of inner radius r_1 and outer radius r_2. [16]

8. Discuss the following
i) Penetration distance.
ii) Logarithmic mean temperature difference (LMTD)
iii) Fouling factors. [5+6+5]

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Code.No: **RR310803** | RR | SET-3

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
HEAT TRANSFER
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks

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1. Discuss the following:
   a) Pool boiling and nucleate boiling
   b) Film boiling [8+8]

2.a) Explain black body radiation.
   b) State and prove Kirchoff's law of radiation. [8+8]

3.a) Derive the equation for combined heat transfer by conduction- convection and radiation.
   b) Write a brief note on "Radiation in film boiling" [10+6]

4.a) Define capacity and economy of an evaporator.
   b) Describe the methods of feeding in multiple effect evaporators. [6+10]

5. Derive an equation for steady – state heat transfer through a spherical shell of inner radius r_1 and outer radius r_2. [16]

6. Discuss the following
   i) Penetration distance.
   ii) Logarithmic mean temperature difference (LMTD)
   iii) Fouling factors. [5+6+5]

7.a) Differentiate between hydrodynamic and thermal boundary layers on a flat plate
   b) Write the significance of the following
   i) Fourier Number
   ii) Graetz number
   iii) Peclet number
   iv) Biot number [8+8]

8. A vertical Plate at 102^0C is 0.75 m wide and 15 cm high. It rests in still air at 1 atm 25^0C. Determine the local heat transfer coefficient at 8 cm from the leading edge of the plate. The properties of the air at film temperature may be taken as:
   Thermal Conductivity = 0.03w/mk
   Viscosity = 2.03×10^{-5} Pas
   Density = 1.00 kg/ m^3
   Specific heat = 1.01 kJ/kg.k [16]

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Code.No: **RR310803** | RR | SET-4

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
HEAT TRANSFER
(CHEMICAL ENGINEERING)

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

Answer any FIVE questions
All questions carry equal marks

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1.a) Derive the equation for combined heat transfer by conduction- convection and radiation.
b) Write a brief note on "Radiation in film boiling" [10+6]

2.a) Define capacity and economy of an evaporator.
b) Describe the methods of feeding in multiple effect evaporators. [6+10]

3. Derive an equation for steady – state heat transfer through a spherical shell of inner radius r_1 and outer radius r_2. [16]

4. Discuss the following
i) Penetration distance.
ii) Logarithmic mean temperature difference (LMTD)
iii) Fouling factors. [5+6+5]

5.a) Differentiate between hydrodynamic and thermal boundary layers on a flat plate
b) Write the significance of the following
i) Fourier Number
ii) Graetz number
iii) Peclet number
iv) Biot number [8+8]

6. A vertical Plate at 102^0C is 0.75 m wide and 15 cm high. It rests in still air at 1 atm 25^0C. Determine the local heat transfer coefficient at 8 cm from the leading edge of the plate. The properties of the air at film temperature may be taken as:
Thermal Conductivity = 0.03w/mk
Viscosity = 2.03×10^{-5} Pas
Density = 1.00 kg/ m^3
Specific heat = 1.01 kJ/kg.k [16]

7. Discuss the following:
a) Pool boiling and nucleate boiling
b) Film boiling [8+8]

8.a) Explain black body radiation.
b) State and prove Kirchoff's law of radiation. [8+8]

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