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

RR

Time: 3hours

Code.No: **RR310803**

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.

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
- A vertical Plate at $102^{\circ}C$ is 0.75 m wide and 15 cm high. It rests in still air at 1 atm 4. $25^{\circ}C$. 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 = 0.03 w/mk Viscosity = 2.03×10^{-5} Pas Density = $1.00 \text{ kg}/m^3$ Specific heat = 1.01 kJ/kg.k[16] 5. Discuss the following: a) Pool boiling and nucleate boiling b) Film boiling [8+8] Explain black body radiation. 6.a)
 - 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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Max.Marks:80

[5+6+5]

[8+8]



Co	de.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
1.a) b)	Differentiate between hydrodynamic and thermal boundary layers on a flat plate 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 $102^{\circ}C$ is 0.75 m wide and 15 cm high. It rests in still air at 1 atm $25^{\circ}C$. 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 = 0.03 w/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) b)	Explain black body radiation.[8+8]State and prove Kirchoff's law of radiation.[8+8]
5.a) b)	Derive the equation for combined heat transfer by conduction- convection and radiation. Write a brief note on "Radiation in film boiling" [10+6]
6.a) b)	Define capacity and economy of an evaporator.[6+10]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 followingi)Penetration distance.ii)Logarithmic mean temperature difference (LMTD)iii)Fouling factors.[5+6+5]

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Co	de.No: RR310803	SET-3
	III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010 HEAT TRANSFER (CHEMICAL ENGINEERING) Time: 3hours Max.M Answer any FIVE questions All questions carry equal marks	arks:80
1.	Discuss the following: a) Pool boiling and nucleate boiling b) Film boiling	[8+8]
2.a) b)	Explain black body radiation. State and prove Kirchoff's law of radiation.	[8+8]
3.a) b)	Derive the equation for combined heat transfer by conduction- convection Write a brief note on "Radiation in film boiling"	and radiation. [10+6]
4.a) b)	Define capacity and economy of an evaporator. Describe the methods of feeding in multiple effect evaporators.	[6+10]
5.	Derive an equation for steady – state heat transfer through a spherical radius r_1 and outer radius r_2 .	shell of inner [16]
6.	 Discuss the following i) Penetration distance. ii) Logarithmic mean temperature difference (LMTD) iii) Fouling factors. 	[5+6+5]
7.a) b)	 Differentiate between hydrodynamic and thermal boundary layers on a fla Write the significance of the following i) Fourier Number ii) Graetz number iii) Peclet number iv) Biot number 	t plate [8+8]
8.	A vertical Plate at $102^{\circ}C$ is 0.75 m wide and 15 cm high. It rests in st $25^{\circ}C$. Determine the local heat transfer coefficient at 8 cm from the lead 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 = $1.00 \text{ kg/}m^3$ Specific heat = 1.01 kJ/kg.k	

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Coo	de.No: RR310803		RR		SET-4
	III B.TECH – Time: 3hours		RANSFER ENGINEER FIVE questi	Max)10 x.Marks:80
1.a) b)	Derive the equation for Write a brief note on "I		•	onduction- convection	ion and radiation. [10+6]
2.a) b)	Define capacity and eco Describe the methods of	• •		vaporators.	[6+10]
3.	Derive an equation for radius r_1 and outer radi	-	heat transfe	er through a spher	ical shell of inner [16]
4.	Discuss the followingi)Penetration distii)Logarithmic meiii)Fouling factors.	ean temperature d	ifference (L	MTD)	[5+6+5]
5.a) b)	Differentiate between Write the significance of i) Fourier Number ii) Graetz number iii) Peclet number	of the following	d thermal bo	oundary layers on a	flat plate
	iv) Biot number				[8+8]
6.	A vertical Plate at 102 $25^{\circ}C$. Determine the l plate. The properties of Thermal Conductivity = Viscosity = 2.03×10^{-5}	ocal heat transfer the air at film ter = 0.03w/mk	r coefficient	at 8 cm from the 1	
	Density = $1.00 \text{ kg}/m^3$ Specific heat = $1.01 \text{ kJ}/m^3$	/kg.k			[16]
7.	Discuss the following: a) Pool boiling and nu- b) Film boiling	cleate boiling			[8+8]
8.a) b)	Explain black body rad State and prove Kircho		ion.		[8+8]

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