Q.P. Code: 20ME3105 **R20**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech I Year II Semester Regular Examinations November-2021

ADVANCED HEAT TRANSFER

(Thermal Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1		Derive general heat conduction equation in Cartesian co-ordinates.	**L6**	**12M**
		OR		
2		What is 'Fourier's law of heat conduction'? State the assumptions on which this law is based?	**L1**	**12M**

UNIT-II

3	**a**	What is convective heat transfer? Distinguish between free and forced convection.	**L1**	**6M**
	b	Derive the expression for Reynolds number and how flows are determined by Reynolds number?	**L6**	**6M**
		OR		
4		Derive expressions for boundary layer thickness and local skin friction coefficient following the Blasius method of solving laminar boundary layer equations for flat plate.	**L6**	**12M**

UNIT-III

5	**a**	What are the unique features of boiling and condensation?	**L1**	**6M**
	b	What are the applications of boiling and condensation process?	**L1**	**6M**
		OR		
6		Explain about film wise condensation and drop wise condensation?	**L2**	**12M**

UNIT-IV

7		What is a heat exchanger? How are heat exchangers classified?	**L1**	**12M**
		OR		
8	**a**	What do you mean by fouling in heat exchangers? What are the different types of fouling processes?	**L1**	**6M**
	b	What are the parameters affecting fouling? How to prevent fouling in heat exchangers?	**L1**	**6M**

UNIT-V

9	**a**	What is Stefan Boltzmann Law? Explain the concept of total emissive power of a surface.	**L1**	**6M**
	b	Assuming the sun to be a black body emitting radiation with maximum intensity at λ = 0.49 μm, Calculate the following: i) The surface temperature of the sun, and ii) The heat flux at the surface of the sun	**L5**	**6M**
		OR		
10		A thin aluminum sheet with an emissivity of 0.1 on both sides is placed between two very large parallel plates that are maintained at uniform temperatures Tl = 800 K and T2 = 500 K and have emissivity 0.2 and 0.7 respectively. Determine the net rate of radiation heat transfer between the two plates per unit surface area of the plates and compare the result to that without shield.	**L5**	**12M**

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