Q.P. Code: 18ME0320 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year II Semester Supplementary Examinations February-2022

HEAT & MASS TRANSFER

(Common to ME & AGE)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	a	How is Heat Transferred	**2M**
	b	Define Fin efficiency	**2M**
	c	What is meant by free or natural convection	**2M**
	d	Define LMTD of a heat exchanger	**2M**
	e	State Stefan Boltzmann Law	**2M**

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	What is convection heat transfer ? Explain its parameters.	**5M**
	b	A plane wall is 150 mm thick and its wall area is 4.5 m2. If its conductivity is 9.35 W/m ^{0}C and surface temperature are steady at 150 ^{0}C and 45 ^{0}C, determine i).Heat transfer across the plane wall, ii).Temperature gradient in the flow direction	**5M**

OR

3	a	Write the laws of radiation.Explain its parameters	**5M**
	b	Derive the general heat conduction equation in Cylindrical coordinate	**5M**

UNIT-II

4	a	Derive an expression for heat conduction through a composite wall	**5M**
	b	Calculate the critical radius of insulation for asbestos (k = 0.172 W/m K) surrounding a pipe and exposed to room air at 300 K with h = 2.8 W/m K Calculate the heat loss from a 475 K, 60 mm diameter pipe when covered with the critical radius of insulation and without insulation	**5M**

OR

5	a	Obtain the expression of heat conduction through hollow cylinder.	**5M**
	b	A 50 cm x 50 cm copper slab 6.25 mm thick has a uniform temperature of 300 0C. Its temperature is suddenly lowered to 36 0C. Calculate the time required for the plate to reach the temperature of 108 . Take ρ = 9000 kg/m3, c = 0.38 kJ/kg 0C, k = 370 W/m 0C and h = 90 W/m20C.	**5M**

UNIT-III

6	**a**	Derive the expression for Reynolds number and how flows are determined by Reynolds number.	**5M**
	b	What is the physical significance of the Nusselt number? How is it defined	**5M**

OR

7	**a**	Define Nusselt number, Prandtl number and their significance	**6M**
	b	A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100^0C in an atmosphere environment of 20 ^{0}C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean temperature as $\rho = 1.06$ kg/m^3, $\nu = 18.97 \times 10^{-6}$ m^2/s, cp = 1.004 kJ/kg^{0}C and k = 0.1042kJ/mh^{0}C	**4M**

UNIT-IV

8		Explain briefly the various regimes of saturated pool boiling with diagram	**10M**

OR

9		Derive the expression for Logarithmic Mean Temperature Difference (LMTD) in case of parallel flow.	**10M**

UNIT-V

10	**a**	Define the term absorptivity, reflectivity and transmittivity of radiation.	**5M**
	b	Explain the modes of Mass transfer.	**5M**

OR

11	**a**	ExplainPlank"s Law, WiensDisplacement Law.	**5M**
	b	What is Mass transfer coefficient?	**5M**

END