O.P.Code: 19ME0319 | R19 | H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Supplementary Examinations May/June-2024
HEAT & MASS TRANSFER
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 60**

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

UNIT-I

1	a	Enumerate the some important areas which are covered under the discipline of heat transfer.	CO1	L1	6M
	b	Distinguish between conduction, convection and radiation modes of heat Transfer.	CO1	L3	6M

OR

2	a	List the basic laws which govern the heat transfer.	CO1	L1	6M
	b	What is conduction heat transfer? Explain its parameters.	CO1	L1	6M

UNIT-II

3	a	Explain the fin effectiveness and fin efficiency.	CO2	L2	6M
	b	Calculate the amount of energy required to solder together two very long pieces of bare copper wire 1.5 mm diameter with solder that melts at 190 ^{0}C. The wires are positioned vertically in air at 20 ^{0}C. Assume that the heat transfer coefficient on the wire surface is 20 W/m2 ^{0}C and thermal conductivity of wire alloy is 330 W/m ^{0}C.	CO2	L4	6M

OR

4	a	Derive the expression for Reynolds number and how flows are determined by Reynolds number.	CO3	L3	6M
	b	What is lumped system analysis? Derive the expression for it.	CO3	L3	6M

UNIT-III

5	a	What is the physical significance of the Nusselt number? How is it defined.	CO3	L1	6M
	b	Assuming that a man can be represented by a cylinder 350 mm in diameter and 1.65 m high with a surface temperature of 28 0C. Calculate the heat he would lose while standing in a 30 km/h wind at 12 0C. Take k=2.59 x10-6 W/m 0C, υ = 15x10-6 m2/s, Pr = 0.707.	CO3	L3	6M

OR

6	a	Mention the empirical correlation of free convection.	CO3	L3	6M
	b	A horizontal plate measuring 1.5 m x 1.1 m and at 215 0C, taking upward is placed in still air at 25 0C. Calculate the heat loss by natural convection. The convective film coefficient for free convection is given by the following empirical relation h = 3.05(Tf)1/4 W/m2 0C. where Tf is the mean film temperature in degree Kelvin.	CO3	L3	6M

UNIT-IV

7	a	Define Radiation heat transfer.	L1	C4	6M
	b	Discuss the different types of processes for condensation of vapours on a solid surface.	L1	C4	6M

OR

8	a	Mention correlation in boiling with proper expression.	L1	C4	6M
	b	Explain Stefan Boltzmann Law, Kirchhoff's Law.	L1	C4	6M

UNIT-V

9		A vertical tube of 60 mm outside diameter and 1.2 m long is exposed to steam at atmospheric pressure. The outer surface of the tube is maintained at a temperature of 50^0C by circulated cold water through the tube. Calculate the following i). The rate of heat transfer to the coolant, and ii). The rate of condensation of steam	L1	C4	12M

OR

10		Define Fick's law. Explain briefly.	L1	C4	12M

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