Q.P. Code: 20ME0315

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations March-2023

HEAT & MASS TRANSFER

(Agricultural Engineering)

Time: 3 hours | Max. Marks: 60

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

UNIT-I

1		Derive the general heat conduction equation in Cylindrical coordinate System.	CO1	L3	12M
		OR			
2	a	Define the following Terms. i). Heat ii).Heat Transfer	CO1	L1	6M
	b	Enumerate the some important areas which are covered under the discipline of heat transfer.	CO1	L1	6M

UNIT-II

3	a	Derive an expression for heat conduction through a plane wall.	CO2	L1	6M
	b	Calculate the critical radius of insulation for asbestos (k = 0.172 W/mK) surrounding a pipe and exposed to room air at 300K with h = 2.8 W/mK. Calculate the heat loss from a 475K, 60 mm diameter pipe when covered with the critical radius of insulation and without insulation.	CO2	L4	6M
		OR			
4	a	Write short note on transient heat conduction.	CO2	L1	6M
	b	A steel ingot (large in size) heated uniformly to 7450C is hardened by quenching it in an oil bath maintained at 200C. Determine the length of time required for the temperature to reach 5950C at a depth of 12 mm. The ingot may be approximated as a flat plate. For steel ingot take α (thermal diffusivity) = 1.2x10-5 m2/s.	CO2	L4	6M

UNIT-III

5		Explain hydrodynamic and thermal boundary layer with reference to flow over flat plate.	CO3	L1	12M
		OR			
6	a	Define Nusselt number, Prandtl number and their significance.	CO3	L1	6M
	b	Air stream at 24^0C is flowing at 0.4 m/s across a 100 W bulb at 130^0C. If the bulbis approximately by a 65 mm diameter sphere. Calculate i) The heat transfer rate ii) The percentage of power lost due to convection	CO3	L4	6M

UNIT-IV

7		Explain briefly the various regimes of saturated pool boiling with diagram.	CO4	L3	12M
		OR			
8	a	Explain the concept of black body	CO4	L3	6M
	b	Explain the surface emissive properties	CO4	L4	6M

UNIT-V

9		The flow rate of hot and cold water streams running through a parallel flow heat exchanger are 0.2 kg/s and 0.5 kg/s respectively. The inlet temperatures on the hot and cold sides are 750C and 200C respectively. The exit temperature of hot water is 450C. If the individual heat transfer coefficients on the both sides are 650 W/m20C, calculate the area of heat exchanger.	CO5	L4	12M
		OR			
10	a	Explain correlation for Mass Transfer.	CO6	L2	8M
	b	List out the application of Mass Transfer.	CO6	L2	4M

*** END ***

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