O.P.Code: 16ME320	R16	H.T.No.									

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

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

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

UNIT-I

1	a	Distinguish between conduction, convection and radiation modes of heat transfer.	CO1	L3	6M
	b	Calculate the rate of heat transfer per unit area through a copper plate 45 mm thick, whose one face is maintained at 350° C and the other face at 50° C. Take thermal conductivity of copper as 370 W/m °C.	CO1	L4	6M
		OR			
2		Derive the general heat conduction equation in Cartesian coordinate.	CO1	L3	12M

UNIT-II

3		A steam pipe of outside diameter 80 mm and 25 m long conveys 800 kg of steam per hour at a pressure of 22 bar. The steam enters the pipe with a dryness fraction of 0.99 and is to leave the other end of the pipe with the minimum dryness fraction of 0.97. This is to be accomplished by using a lagging material (k = 0.2 W/m °C), determine its minimum thickness to meet the necessary condition, if the temperature of the outside surface of lagging is 25°C. Assume that there is no pressure drop across the pipe and the resistance of the pipe material is negligible.	CO1	L4	12M
		OR			
4	a	Explain the fin effectiveness and fin efficiency	CO1	L2	6M
	b	A longitudinal copper fin (k = 380 W/m °C) 600 mm long and 5 mm diameter is exposed to air stream at 20 °C. The convective heat transfer coefficient is 20 W/ m2 °C. If the fin base temperature is 150 °C, determine i. The heat transferred, and ii. The efficiency of the fin.	CO1	L4	6M

UNIT-III

5		Explain hydrodynamic and thermal boundary layer with reference to flow over flat plate.	CO1	L2	12M
		OR			
6	a	What is convective heat transfer? Distinguish between free and forced convectio	CO1	L1	6M
	b	Derive the expression for Reynolds number and how flows are determined by Reynolds number.	CO1	L3	6M

UNIT-IV

7	a	Differentiate between the mechanism of filmwise and dropwise condensatio	CO2	L3	6M
	b	Explain briefly the condensation mechanism on the vertical plate.	CO2	L2	6M
		OR			

8	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 75°C and 20 °C respectively. The exit temperature of hot water is 45°C. If the individual heat transfer coefficients on the both sides are 650 W/m^2 °C, calculate the area of heat exchanger.		CO2	L4	12M
	UNIT-V				
9	a	What is black body ? How is differ from a gray body ?	CO2	L1	6M
	b	The effective temperature of the body having an area of 0.12 m2 is 527°C. Calculate the following i) The total rate of energy emission ii) The wave length of maximum monochromatic emissive power	CO2	L4	6M
		OR			
10	a	Define Shape factor and mention salient features of its.	CO2	L1	6M
	b	Mention the shape factor's fact and properties for specific geometries and for the analysis of radiant relation exchange between surfaces.	CO2	L3	6M

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